# United States District Court

**EASTERN DISTRICT OF TEXAS**
**SHERMAN DIVISION**

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| E-SYSTEM DESIGN, INC. | § | |
| | § | |
| v. | § | CIVIL ACTION NO. 4:17-cv-682 |
| | § | Judge Mazzant |
| MENTOR GRAPHICS CORP. | § | |
| | § | |

## CLAIM CONSTRUCTION MEMORANDUM OPINION AND ORDER

Before the Court are Plaintiff E-System Design, Inc.'s ("Plaintiff's" or "E-System's") Claim Construction Opening Brief (Dkt. #74), Defendant Mentor Graphics Corp.'s ("Defendant's" or "Mentor's") Responsive Claim Construction Brief (Dkt. #79), and Plaintiff's Claim Construction Reply Brief (Dkt. #80). Also before the Court are the parties' September 17, 2018 Joint Claim Construction and Prehearing Statement (Dkt. #72) and the parties' November 26, 2018 Amended Joint Claim Construction Chart (Dkt. #87). The Court held a claim construction hearing on November 27, 2018, to determine the proper construction of the disputed claim terms in United States Patent No. 8,352,232 ("the '232 Patent").

The Court issues this Claim Construction Memorandum Opinion and Order and hereby incorporates-by-reference the claim construction hearing and transcript as well as the demonstrative slides presented by the parties during the hearing. (*See* Dkt. #89 & Dkt. #90). For the following reasons, the Court provides the constructions set forth below.

## BACKGROUND

Plaintiff has brought suit alleging infringement of United States Patent No. 8,352,232. The '232 Patent, titled "Modeling Electrical Interconnections in Three-Dimensional Structures," issued on January 8, 2013, and bears an earliest priority date of October 25, 2007. Plaintiff submits that

the ’232 Patent relates to “3D circuits or System-in-Package modules, in which layers of computer chips are stacked on top of one another.” (Dkt. #74 at p. 1). The Abstract of the ’232 Patent states:

> Disclosed are apparatus, methods and software that implement a partial element equivalent circuit (PEEC) method having global basis functions on cylindrical coordinates to determine wide-band resistance, inductance, capacitance, and conductance from a large number of three-dimensional interconnections in order to provide for the electrical design of system-in-package (SIP) modules, and the like. The apparatus, methods and software use a modal equivalent network from mixed potential integral equation with cylindrical conduction and accumulation mode basis functions, which reduces the matrix size for large three-dimensional interconnection problems. Combined with these modal basis functions, the mixed potential integral equations describe arbitrary skin and proximity effects, and allow determination of partial impedance and admittance values. Additional enhancement schemes further reduces [*sic*] the cost for computing the partial inductances. Therefore, the apparatus, methods and software can be used to construct accurate models of a large number of three-dimensional interconnection structures, including more than 100 bonding wires used for stacking integrated circuit chips, through-silicon via interconnections, and the like.

## LEGAL STANDARDS

Claim construction is a matter of law. *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995). The purpose of claim construction is to resolve the meanings and technical scope of claim terms. *U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997). When the parties dispute the scope of a claim term, “it is the court’s duty to resolve it.” *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008).

“It is a ‘bedrock principle’ of patent law that ‘the claims of a patent define the invention to which the patentee is entitled the right to exclude.’” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (quoting *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). The Court examines a patent’s intrinsic evidence to define the patented invention’s scope. *Id.* at 1313–14; *Bell Atl. Network Servs., Inc. v. Covad Commc’ns Group, Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001). Intrinsic evidence includes the claims, the rest of the specification, and the prosecution history. *Phillips*, 415 F.3d at 1312–13; *Bell Atl. Network*

*Servs.*, 262 F.3d at 1267. The Court gives claim terms their ordinary and customary meaning as understood by one of ordinary skill in the art at the time of the invention. *Phillips*, 415 F.3d at 1312–13; *Alloc, Inc. v. Int'l Trade Comm'n*, 342 F.3d 1361, 1368 (Fed. Cir. 2003).

Claim language guides the Court's construction of claim terms. *Phillips*, 415 F.3d at 1314. "[T]he context in which a term is used in the asserted claim can be highly instructive." *Id.* Other claims, asserted and unasserted, can provide additional instruction because "terms are normally used consistently throughout the patent." *Id.* Differences among claims, such as additional limitations in dependent claims, can provide further guidance. *Id.*

"[C]laims 'must be read in view of the specification, of which they are a part.'" *Id.* at 1315 (quoting *Markman*, 52 F.3d at 979). "[T]he specification 'is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.'" *Id.* (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *Teleflex. Inc. v. Ficosa N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002). In the specification, a patentee may define his own terms, give a claim term a different meaning than it would otherwise possess, or disclaim or disavow some claim scope. *Phillips*, 415 F.3d at 1316. Although the Court generally presumes terms possess their ordinary meaning, this presumption can be overcome by statements of clear disclaimer. *See SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1343–44 (Fed. Cir. 2001). This presumption does not arise when the patentee acts as his own lexicographer. *See Irdeto Access, Inc. v. EchoStar Satellite Corp.*, 383 F.3d 1295, 1301 (Fed. Cir. 2004).

The specification may also resolve ambiguous claim terms "where the ordinary and accustomed meaning of the words used in the claims lack sufficient clarity to permit the scope of the claim to be ascertained from the words alone." *Teleflex*, 299 F.3d at 1325. For example, "[a]

claim interpretation that excludes a preferred embodiment from the scope of the claim 'is rarely, if ever, correct.'" *Globetrotter Software, Inc. v. Elan Computer Group Inc.*, 362 F.3d 1367, 1381 (Fed. Cir. 2004) (quoting *Vitronics*, 90 F.3d at 1583). But, "[a]lthough the specification may aid the court in interpreting the meaning of disputed language in the claims, particular embodiments and examples appearing in the specification will not generally be read into the claims." *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988); *accord Phillips*, 415 F.3d at 1323.

The prosecution history is another tool to supply the proper context for claim construction because a patentee may define a term during prosecution of the patent. *Home Diagnostics Inc. v. LifeScan, Inc.*, 381 F.3d 1352, 1356 (Fed. Cir. 2004) ("As in the case of the specification, a patent applicant may define a term in prosecuting a patent."). The well-established doctrine of prosecution disclaimer "preclud[es] patentees from recapturing through claim interpretation specific meanings disclaimed during prosecution." *Omega Eng'g Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323 (Fed. Cir. 2003). "Indeed, by distinguishing the claimed invention over the prior art, an applicant is indicating what the claims do not cover." *Spectrum Int'l v. Sterilite Corp.*, 164 F.3d 1372, 1378–79 (Fed. Cir. 1988) (quotation omitted). "As a basic principle of claim interpretation, prosecution disclaimer promotes the public notice function of the intrinsic evidence and protects the public's reliance on definitive statements made during prosecution." *Omega Eng'g*, 334 F.3d at 1324. However, the prosecution history must show that the patentee clearly and unambiguously disclaimed or disavowed the proposed interpretation during prosecution to obtain claim allowance. *Middleton Inc. v. 3M Co.*, 311 F.3d 1384, 1388 (Fed. Cir. 2002). Statements will constitute disclaimer of scope only if they are "clear and unmistakable statements of disavowal." *See Cordis Corp. v. Medtronic AVE, Inc.*, 339 F.3d 1352, 1358 (Fed. Cir. 2003). An "ambiguous disavowal"

will not suffice. *Schindler Elevator Corp. v. Otis Elevator Co.*, 593 F.3d 1275, 1285 (Fed. Cir. 2010) (citation omitted).

Although "less significant than the intrinsic record in determining the legally operative meaning of claim language," the Court may rely on extrinsic evidence to "shed useful light on the relevant art." *Phillips*, 415 F.3d at 1317 (quotation omitted). Technical dictionaries and treatises may help the Court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but such sources may also provide overly broad definitions or may not be indicative of how terms are used in the patent. *Id.* at 1318. Similarly, expert testimony may aid the Court in determining the particular meaning of a term in the pertinent field, but "conclusory, unsupported assertions by experts as to the definition of a claim term are not useful." *Id.* Generally, extrinsic evidence is "less reliable than the patent and its prosecution history in determining how to read claim terms." *Id.*

The Supreme Court of the United States has "read [35 U.S.C.] § 112, ¶ 2 to require that a patent's claims, viewed in light of the specification and prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2129 (2014). "A determination of claim indefiniteness is a legal conclusion that is drawn from the court's performance of its duty as the construer of patent claims." *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1347 (Fed. Cir. 2005) (citations and internal quotation marks omitted), *abrogated on other grounds by Nautilus*, 134 S. Ct. 2120. "Indefiniteness must be proven by clear and convincing evidence." *Sonix Tech. Co. v. Publ'ns Int'l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017).

## ANALYSIS

### I. Agreed Claim Terms

"The parties do not agree on a proposed construction for any disputed term in the '232 patent." (Dkt. #72 at p. 1).

### II. Disputed Claim Terms

Plaintiff has presented alternative proposed constructions for most of the disputed terms, and Defendant argues that those alternative proposals should be stricken as untimely, arguing that "[t]his rule violation prejudiced Mentor." (Dkt. #79 at p. 2). Plaintiff replies that, after deposing Defendant's expert, "E-System proposed alternative construction[s] that were generally based on unobjectionable aspects of Mentor's constructions." (Dkt. #80 at p. 1). Upon review, and in light of the Court's analysis of these disputed terms herein, the Court finds no prejudice to Defendant that would warrant striking any of Plaintiff's alternative proposed constructions.

#### a. **"basis function(s)"**

| **Plaintiff's Proposed Construction** | **Defendant's Proposed Construction** |
|---|---|
| Plain meaning<br><br>In the alternative:<br>A set of mathematical functions that can be linearly combined to represent another function or functions. | A set of mathematical functions designed to be linearly combined to describe another function or functions which constitute the solution to a mathematical problem.[1] |

(Dkt. #74 at p. 5; Dkt. #79 at p. 14; Dkt. #87 at p. 1; *see* Dkt. #72, Ex. A at p. 1). The parties submit that this term appears in Claims 1, 7, and 13. (Dkt. #87 at p. 1).

[1] Defendant previously proposed: "A set of mathematical functions designed to be linearly combined to describe *other functions* which constitute the solution to a mathematical problem." (Dkt. #72, Ex. A at p. 1) (emphasis added).

i. *The Parties' Positions*

Plaintiff argues that "[t]his term does not require construction because it is used in the claims in accordance with the ordinary and customary meaning as understood by someone of ordinary skill in the art." (Dkt. #74 at p. 5). Plaintiff also argues that Defendant's proposal should be rejected because whereas "Mentor cites no support for its use of the word 'describe,'" the word "represent" "more accurately reflects the reality that basis functions do not necessarily exactly describe another function but instead reflect an approximation of it." (*Id.* at p. 6).

Defendant responds that construction is necessary because the parties dispute the plain mathematical meaning of this term. (Dkt. #79 at p. 15). Defendant submits that the specification discloses, for example, that "basis functions" are linearly combined to "describe" a density distribution. (*Id.*) (citing '232 Patent at 7:14–17). Defendant also notes that neither party proposes the mathematical definition set forth in a technical dictionary cited by Plaintiff. (*Id.* at p. 14).

Plaintiff replies that Defendant's expert "agrees that basis functions can be used to solve, for example, physics problems, not just pure mathematical problems" and "agree[s] that 'represent' . . . is just as good as 'describe.'" (Dkt. #80 at p. 6).

ii. *Analysis*

Claim 1 of the '232 Patent, for example, recites (emphasis added):

> 1. Electrical modeling apparatus for electrically modeling three-dimensional circuit structures having cylindrical conductors, comprising:
> a computer; and
> software that runs on the computer that comprises:
> a first code segment that defines a plurality of cylindrical conduction mode *basis functions* constructed on cylindrical coordinates;
> a second code segment that defines a plurality of cylindrical accumulation mode *basis functions* constructed on cylindrical coordinates;
> a third code segment that linearly combines selected cylindrical conduction mode *basis functions* to approximate a current density distribution over a cross section of a cylindrical conductor;

> a fourth code segment that linearly combines selected cylindrical accumulation mode *basis functions* to approximate a charge density distribution over the cross section of the cylindrical conductor; and
>
> a fifth code segment that constructs equivalent circuit equations from the selected cylindrical conduction and accumulation mode *basis functions*.

Defendant's proposal of "describes" finds some support in the specification, which discloses:

> FIG. 2 illustrates how the linear combination of skin-effect- and proximity-effect-mode basis functions *describes* a specified current density distribution induced by the vicinity of nearby conductors.

'232 Patent at 7:14–17 (emphasis added). This disclosure, however, uses the word "describes" to refer to a current density distribution rather than another function.

The word "represents" is more consistent with the context of the parties' proposals, which refer to one set of functions in relation to another function or functions. This understanding is further reinforced by a technical dictionary definition that Defendant's own expert referred to as "a perfectly fine definition of basis function." (*See* Dkt. #74, Ex. A, Sept. 21, 2018 Nagel dep. at 52:15–53:22 & Ex. 3, *Comprehensive Dictionary of Electrical Engineering* 57 (2d ed. 2005) (p. 106 of 109 of Ex. A) ("one of a set of functions used to represent a function . . .")).[2]

Plaintiff appears to agree that "basis functions" are mathematical, but Plaintiff has opposed Defendant's proposal of referring to solving a "mathematical problem." On one hand, Defendant's expert has opined, for example, that "a physics problem is reduced to a mathematics problem to use mathematics to solve it." (Dkt. #79, Ex. D, Sept. 21, 2018 Nagel dep. at 49:2–7). On the other hand, the parties already agree that "basis functions" are "mathematical" functions. On balance,

[2] Defendant has argued that Plaintiff did not timely disclose this evidence and therefore it should not be considered (*see* Dkt. #79 at p. 1), but the Court considers this evidence in the context of Defendant's expert having agreed with the definition.

Defendant's proposal of "which constitute the solution to a mathematical problem" is redundant and would tend to confuse rather than clarify the scope of the claims.

Finally, Defendant has not adequately supported its proposal that the functions must be "designed" to be linearly combined. Such a construction might also carry significant risk of confusion as to whether a designer's state of mind must be proven in order to show infringement.

The Court therefore hereby construes **"basis function(s)"** to mean **"a set of mathematical functions that can be linearly combined to represent another function or functions."**

b. **"constructed on cylindrical coordinates"**

| **Plaintiff's Proposed Construction** | **Defendant's Proposed Construction** |
|---|---|
| Plain meaning | Calculated in 3D with: (1) position along the cylinder's long axis, (2) radial distance from the long axis, and (3) azimuth. Azimuth is the angular position around the long axis relative to a reference direction, similar to how longitude on the Earth is a position around the Earth's axis. |

(Dkt. #72, Ex. A at p. 13; Dkt. #74 at p. 7; Dkt. #79 at p. 15; Dkt. #87 at pp. 1–2). The parties submit that this term appears in Claims 1, 7, and 13. (Dkt. #87 at p. 1).

i. *The Parties' Positions*

Plaintiff argues that "[t]his phrase does not require construction because it is used in the claims in accordance with the ordinary and customary meaning as understood by someone with ordinary skill in the art." (Dkt. #74 at p. 8). Plaintiff submits that "[w]ithout any evidence that the term 'constructed' is used in any way other than its ordinary meaning or would be confusing to a jury, the claim terms should not be unnecessarily defined." (*Id.* at pp. 8–9). Plaintiff also argues that "[j]urors will see cylindrical conductors throughout trial, and will already understand

at a basic level that cross-sections of cylinders (i.e., circles) are measured differently than squares from basic high school geometry." (*Id.* at p. 9).

Defendant responds that this term must be construed because the parties disagree as to the plain technical meaning. (Dkt. #79 at p. 15). Defendant argues that, in the context of mathematical functions, "constructed on" means "calculated in." (*Id.*)

Plaintiff replies that "any juror would easily understand what the word 'constructed' means in this context." (Dkt. #80 at p. 6). Plaintiff also argues that "[t]he parties agree on the components of cylindrical coordinates, and Mentor has not argued that the names and descriptions of the actual components of the cylindrical coordinates are necessary to understanding the claims." (*Id.* at p. 7). "Finally," Plaintiff replies, "Mentor agrees that '3D' is a 'qualifier' that already exists elsewhere in the claims." (*Id.*)

ii. *Analysis*

Claim 1 of the '232 Patent, for example, recites (emphasis added):

> 1. Electrical modeling apparatus for electrically modeling three-dimensional circuit structures having cylindrical conductors, comprising:
> a computer; and
> software that runs on the computer that comprises:
> a first code segment that defines a plurality of cylindrical conduction mode basis functions *constructed on cylindrical coordinates*;
> a second code segment that defines a plurality of cylindrical accumulation mode basis functions *constructed on cylindrical coordinates*;
> a third code segment that linearly combines selected cylindrical conduction mode basis functions to approximate a current density distribution over a cross section of a cylindrical conductor;
> a fourth code segment that linearly combines selected cylindrical accumulation mode basis functions to approximate a charge density distribution over the cross section of the cylindrical conductor; and
> a fifth code segment that constructs equivalent circuit equations from the selected cylindrical conduction and accumulation mode basis functions.

"Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the

determination of infringement. It is not an obligatory exercise in redundancy." *U.S. Surgical*, 103 F.3d at 1568; *see Summit 6, LLC v. Samsung Elecs. Co., Ltd.*, 802 F.3d 1283, 1291 (Fed. Cir. 2015).

Here, Plaintiff submits that "the names and descriptions of the actual components of the cylindrical coordinates are unimportant to the claims," and "[n]obody disputes what those components are." (Dkt. #74 at p. 9). For example, Defendant's expert agrees that a person of ordinary skill in the art would understand "azimuth" and would understand that cylindrical coordinates are "in 3D." (*Id.*, Ex. A, Sept. 21, 2018 Nagel dep. at 55:18–56:2, 60:15–18, 63:25–64:25 & 71:1–16; *see id.* at 129:21–130:11 ("that is the ordinary meaning")). Also, Defendant's expert has not attributed any special significance to Defendant's proposal of "calculated" other than to reinforce that the term at issue is used in a mathematical context. (*See id.* at 56:3–13 & 58:16–22).

Therefore, Defendant has not shown that any construction is necessary to "ensure that the jury fully understands the court's claim construction rulings and what the patentee covered by the claims.'" *Power-One, Inc. v. Artesyn Techs., Inc.*, 599 F.3d 1343, 1348 (Fed. Cir. 2010) (citation and internal quotation marks omitted); *see O2 Micro*, 521 F.3d at 1362 ("[D]istrict courts are not (and should not be) required to construe every limitation present in a patent's asserted claims."); *see also Finjan, Inc. v. Secure Computing Corp.*, 626 F.3d 1197, 1207 (Fed. Cir. 2010) ("Unlike *O2 Micro*, where the court failed to resolve the parties' quarrel, the district court rejected Defendants' construction."); *Summit 6*, 802 F.3d at 1291.

Defendant has expressed concern that Plaintiff's infringement analysis fails to properly give effect to the requirement of using "cylindrical coordinates." (*See* Dkt. #79 at pp. 16–17). At the November 27, 2018 hearing, Defendant emphasized that polar coordinates, for example, are

two dimensional and are *not* a type of cylindrical coordinates. On balance, this concern relates to factual issues regarding infringement rather than any legal question for claim construction. *See PPG Indus. v. Guardian Indus. Corp.*, 156 F.3d 1351, 1355 (Fed. Cir. 1998) ("after the court has defined the claim with whatever specificity and precision is warranted by the language of the claim and the evidence bearing on the proper construction, the task of determining whether the construed claim reads on the accused product is for the finder of fact"); *see also Eon Corp. IP Holdings LLC v. Silver Spring Networks, Inc.*, 815 F.3d 1314, 1318–19 (Fed. Cir. 2016) (citing *PPG*).

The Court accordingly hereby finds that **"constructed on cylindrical coordinates"** has its **plain meaning**.

c. **"current density distribution" and "charge density distribution"**

| **"current density distribution"** | |
|---|---|
| **Plaintiff's Proposed Construction** | **Defendant's Proposed Construction** |
| Plain meaning<br><br>In the alternative:<br>The distribution of an electrical current per unit area or per unit distance. | The electrical current per unit area at each point in a region. |
| **"charge density distribution"** | |
| **Plaintiff's Proposed Construction** | **Defendant's Proposed Construction** |
| Plain meaning<br><br>In the alternative:<br>The distribution of an electrical charge per unit area, per unit volume, or per unit distance. | The electrical charge per unit area or per unit volume at each point in a region. |

(Dkt. #74 at p. 10; Dkt. #79 at p. 17; *see* Dkt. #72, Ex. A at pp. 18 & 23). The parties submit that these terms appear in Claims 1, 7, and 13. (Dkt. #87 at p. 2).

i. *The Parties' Positions*

Plaintiff argues that "[t]hese phrases do not require construction because they have a well-known meaning to one of ordinary skill in the art, and a skilled artisan would have understood the '232 patent to use these phrases in accordance with that plain meaning." (Dkt. #74 at p. 10). Plaintiff also submits that "Mentor really only proposes to construe 'density distribution' in each phrase," which "are both words that are easily understood by the average juror." (*Id.* at p. 11).

Defendant responds that "these are distributions over a region, i.e., the value at each point in a region as shown in the patent's Fig. 2, not an average value over a region." (Dkt. #79 at p. 18). Defendant also argues that Plaintiff "cites no evidence that [these terms] are in common parlance," and "[n]ot a single sentence in the patent refers to charge density distribution over a line." (*Id.*)

Plaintiff replies that "[s]ince the context of the claims refers to 'approximat[ing]' current and charge density distribution rather than calculating them, building in a reference to 'at each point' (an infinite number) unnecessarily creates potential confusion . . . ." (Dkt. #80 at p. 7). Plaintiff also argues that "Mentor leaves out one way to measure charge or current density—per unit distance—from its construction despite the lack of narrowing statements in the intrinsic record." (*Id.* at p. 8).

ii. *Analysis*

As a threshold matter, Plaintiff has argued that Defendant's proposal of "at each point in a region" should be rejected as requiring an infinite number of points (thus requiring performing an infinite number of mathematical operations, which the parties appear to agree would be impossible). (Dkt. #74 at p. 11). The claim, however, merely recites using functions "to *approximate* a current density distribution" and "to *approximate* a charge density distribution." In this context, Defendant's proposal would not necessarily require an infinite number of

calculations. Also, Defendant's expert has explained that the functions can be used to make a calculation at *any* point and need not necessarily be used to make a calculation at *every* point. (*See* Dkt. No. 74, Ex. A, Sept. 21, 2018 Nagel dep. at 194:2–13 & 199:12–200:18). The parties thus do not appear to have any substantive disagreement in this regard.

As to Plaintiff's proposal of "per unit distance," Plaintiff has cited a textbook that refers to a "line charge." (*See* Dkt. #74, Ex. E, *Engineering Electromagnetics* 38–39, 227, 238 (6th ed. 2001)). First, this is extrinsic evidence, and Plaintiff has not identified any intrinsic evidence that refers to a line charge at all, let alone in the context of the claimed invention. *See Phillips*, 415 F.3d at 1317 (noting that extrinsic evidence is "less significant than the intrinsic record in determining the legally operative meaning of claim language") (citations and internal quotation marks omitted). Second, even this extrinsic evidence itself merely states that in cases of "a very fine, sharp beam," it may be "*convenient* to treat the charge as a line charge . . . ." (Dkt. #74, Ex. E, *Engineering Electromagnetics* 39 (6th ed. 2001)) (emphasis added). Plaintiff thus has not shown that the ordinary meanings of "current density distribution" and "charge density distribution" encompass distribution per unit distance, particularly in the context of the claim here at issue, which refers to cylindrical coordinates.[3] The Court likewise rejects Plaintiff's suggestion, at the November 27, 2018 hearing, of referring to density "per unit of measurement."

As to whether construction is necessary, Defendant's expert has stated that the terms "current density distribution" and "charge density distribution" have had well-known meanings in the relevant art at all relevant times. (*See* Dkt. No. 74, Ex. A, Sept. 21, 2018 Nagel dep. at 130:18–131:8 & 141:7–13). Nonetheless, in light of the parties' above-resolved dispute regarding "per

[3] Defendant has argued that Plaintiff did not timely disclose this evidence and therefore it should not be considered. (*See* Dkt. #79 at p. 1). Because the Court finds that Plaintiff's reliance on this evidence is unpersuasive, Defendant's objection is moot.

unit distance," construction is useful and appropriate to the extent that the parties are otherwise in substantive agreement. This apparent agreement is also consistent with extrinsic dictionary definitions cited by Defendant. (*See id.*, Ex. J, *Modern Dictionary of Electronics* 152, 219 (6th ed. 1984) (defining "charge density" as "The charge per unit area on a surface, or charge per unit volume in a space"; defining "current density" as: "The amount of electric current passing through a given cross-sectional area of a conductor in amperes per square inch . . . .")).

The Court therefore hereby construes these disputed terms as set forth in the following chart:

| Term | Construction |
|---|---|
| **"current density distribution"** | **"the electrical current per unit area at each point in a region"** |
| **"charge density distribution"** | **"the electrical charge per unit area or per unit volume at each point in a region"** |

d. **"cylindrical accumulation mode basis functions"**

| **Plaintiff's Proposed Construction** | **Defendant's Proposed Construction** |
|---|---|
| Basis functions that enable description of charge density distribution. | Scalar basis functions describing the charge density distribution on the surface of the cylindrical conductor. Scalar means magnitude without direction. |

(Dkt. #72, Ex. A at p. 27; Dkt. #74 at p. 12; Dkt. #79 at p. 27). The parties submit that this term appears in Claims 1, 7, and 13. (Dkt. #87 at p. 2).

i. *The Parties' Positions*

Plaintiff submits that the patentees "coined" this term, which Plaintiff abbreviates as "CAMBFs." (Dkt. #74 at p. 12). Plaintiff proposes that this term should be construed according to "the fundamental description of this term provided by the inventors at the outset of the Detailed

Description." (*Id.*) Plaintiff argues that Defendant's proposal "reads in aspects of particular preferred embodiments" and "inserts language that the '232 patent never uses to describe the CAMBFs." (*Id.*)

Defendant responds that the specification defines this term as scalar, and "applicants defined this coined term without once referring to it as a vector quantity." (Dkt. #79 at p. 19). Defendant also argues that "[t]he specification consistently states that charge density is on the surface and that accumulation mode basis functions describe that charge density on the surface." (*Id.*)

Plaintiff replies that "[i]t is only in discussing three exemplary CAMBFs (in equations 13, 14, and 15) that the specification uses the term 'scalar.'" (Dkt. #80 at p. 8). Plaintiff also argues that "[w]hile the '232 patent's exemplary CAMBFs capture charge density on the conductor's surface (since no charge accumulates in an ideal conductor's interior), neither the Abstract, the general description of CAMBFs in column 4, or the claims limit CAMBFs in this manner." (*Id.* at p. 9).

ii. *Analysis*

"Idiosyncratic language, highly technical terms, or terms coined by the inventor are best understood by reference to the specification." *Intervet Inc. v. Merial Ltd.*, 617 F.3d 1282, 1287 (Fed. Cir. 2010) (citing *Phillips*, 415 F.3d at 1315); *see Telemac Cellular Corp. v. Topp Telecom, Inc.*, 247 F.3d 1316, 1326 (Fed. Cir. 2001) ("Because the term 'complex billing algorithm' does not have an ordinary meaning, and its meaning is not clear from a plain reading of the claim, we turn to the remaining intrinsic evidence, including the written description, to aid in our construction of that term."). Plaintiff agrees that "cylindrical accumulation mode basis functions" is a coined

term that does not have an accepted meaning in the art. (Dkt. #74 at p. 12). The specification discloses:

> Formulation of a Mixed Potential Integral Equation with Cylindrical Modal Basis Functions
>
> Discussed below are modal basis functions and their classification. The cylindrical modal basis functions *enable description* of current and charge density distribution. These basis functions are used to construct a equivalent circuit equation.

'232 Patent at 4:59–63 (emphasis added). This disclosure supports Plaintiff's proposal of "enable description."

Plaintiff's proposed construction, however, fails to account for the constituent term "cylindrical," and the specification discloses that cylindrical accumulation mode basis functions are scalar and relate to charge density distribution on the surface of the cylindrical conductor:

> The cylindrical accumulation mode basis function captures the charge density distribution on the *surface of cylindrical conductors*, which are governed by the following Laplace's equation, . . . .
>
> * * *
>
> The cylindrical accumulation mode basis functions have the same harmonic variations as the cylindrical conduction mode basis function. On the other hand, the accumulation mode bases are different from the conduction mode bases in that they are *scalar functions defined on the conductor surfaces*.

*Id.* at 7:21–25 & 7:53–58 (emphasis added).

The patentee thus defined the coined term "cylindrical accumulation mode basis functions" as scalar basis functions that describe charge density distribution on the surface of a cylindrical conductor. *See Intellicall, Inc. v. Phonometrics, Inc.*, 952 F.2d 1384, 1388 (Fed. Cir. 1992) ("So long as the meaning of an expression is made reasonably clear and its use is consistent within a patent disclosure, an inventor is permitted to define the terms of his claims.") (quoting *Lear Siegler, Inc. v. Aeroquip Corp.*, 733 F.2d 881, 889 (Fed. Cir. 1984) (emphasis added)). The above-

reproduced statements are not accompanied by any express or implied indication that these statements are limited to a particular embodiment. *See Sinogchem Co. v. ITC*, 511 F.3d 1132, 1138 (Fed. Cir. 2007) ("When the specification explains and defines a term used in the claims, without ambiguity or incompleteness, there is no need to search further for the meaning of the term.") (quoting *Multiform Desiccants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1478 (Fed. Cir. 1998)) (emphasis added)).

These disclosures in the specification are further reinforced by prosecution history in which the patentee stated:

> [T]he independent claims recite defining both accumulation mode basis functions and cylindrical conduction mode basis functions and then combining both types of basis functions to generate equivalent circuit equations. *Accumulation mode basis functions are functions that describe charge density distribution on the surface of a conductor.* The accumulation basis functions, which are derived by solving Laplace's equation, are frequency independent and hence using these basis functions is very useful for calculating conductance and capacitance since it is computationally inexpensive. On the other hand, conduction mode basis functions describe current (rather than charge) density in a conductor, which is more distributed in the interior portions of a conductor. As the present invention is directed to simulating cylindrical conductors, such as through-silicon vias and through glass vias in an integrated circuit or package, it uses cylindrical basis functions. Because the outer skin of a cylindrical conductor is continuous and does not have any edges, the use of a [*sic*] cylindrical accumulation mode basis functions to model charge density and conduction mode basis functions to model current density reduces the computational complexity of the cylindrical conductor simulation considerably.

(Dkt. #74, Ex. F, Nov. 12, 2012 Amendment and Response to Office Action at pp. 10–11) (emphasis added). Thus, when discussing the claim language here at issue, the patentee explained that accumulation mode basis functions describe charge density distribution on the *surface* of a conductor. (*See id.*)[4] The patentee's statements thus further support Defendant's proposed

[4] At the November 27, 2018 hearing, Plaintiff argued that Defendant has not met the standard for showing a prosecution disclaimer. Defendant responded that Defendant is not arguing for a finding of disclaimer. Defendant argued that this coined term can be only as broad as is supported by the intrinsic record.

interpretation. *See MasterMine Software, Inc. v. Microsoft Corp.*, 874 F.3d 1307, 1312 (Fed. Cir. 2017) ("this explanation presented by the inventor during patent examination is relevant to claim construction").[5]

Plaintiff has noted that Claim 1 of the '232 Patent recites using cylindrical accumulation mode basis functions "to approximate a charge density distribution over the *cross section* of the cylindrical conductor." This limitation has been presented as part of the separate disputed term "linearly combine(s) selected cylindrical accumulation mode basis functions to approximate a charge density distribution over the cross section of the cylindrical conductor," which is addressed below.

Also of note, whereas dependent Claim 2, for example, recites that "the cylindrical *conduction* mode basis functions define skin and proximity effects of currents *in* the cylindrical conductors," dependent Claim 3 recites that "the cylindrical *accumulation* mode basis functions define skin and proximity effects of charges *on* the cylindrical conductors." Dependent Claims 8, 9, 14, and 15 are similar in this regard. The dependent claims are thus consistent with Defendant's proposal that cylindrical accumulation mode basis functions describe charge density distribution *on the surface* of cylindrical conductors. *See Phillips*, 415 F.3d at 1314 ("Other claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment as to the meaning of a claim term.").

Plaintiff has not persuasively justified a broader interpretation of the disputed term. Construing the disputed term consistent with the above-cited claim language and the above-reproduced specification disclosures is appropriate to "tether the claims to what the specifications

[5] The opinions of Defendant's expert are further persuasive in this regard. (*See, e.g.*, Dkt. #79, Ex. D, Sept. 21, 2018 Nagel dep. at 139:11–140:5) ("You're not getting a distribution over a cross section because those functions can't calculate that. They don't have that capability. They're only good at the surface.").

indicate the inventor actually invented." *Retractable Techs., Inc. v. Becton, Dickinson & Co.*, 653 F.3d 1296, 1305 (Fed. Cir. 2011). Again, the parties agree that this disputed term lacks any accepted meaning in the art, and "absent such an accepted meaning, we construe a claim term only as broadly as provided for by the patent itself." *Irdeto Access, Inc. v. Echostar Satellite Corp.*, 383 F.3d 1295, 1300 (Fed. Cir. 2004); *see Meds. Co. v. Mylan, Inc.*, 853 F.3d 1296, 1306–09 (Fed. Cir. 2017) (similar). Plaintiff has cited the final paragraph of the written description, which concludes that "numerous and other arrangements can be readily devised by those skilled in the art without departing from the scope of the invention" ('232 Patent at 17:45–54), but Plaintiff has not shown how this statement warrants departing from the legal principles regarding terms that have no accepted meaning in the art. *See Irdeto*, 383 F.3d at 1300.

Further, Plaintiff has argued that Defendant's proposal of "scalar" is improper because "it is possible to derive a scalar quantity from a vector quantity" and because "[w]hile Mentor correctly notes that charge accumulates on the conductor's surface in an ideal conductor, the claims are not limited to an ideal conductor." (Dkt. #74 at p. 15; *see* Dkt. #80 at p. 8). Plaintiff has noted that the specification refers to an "assumption . . . that the medium is a good conductor." '232 Patent at 5:32–34. But even assuming (without deciding) that Plaintiff's assertions are correct, the above-reproduced portion of the specification is unambiguous that cylindrical accumulation mode basis functions are scalar functions. *See* '232 Patent at 7:53–58; *see also Intervet*, 617 F.3d at 1287.

Finally, Defendant has proposed including an explanation of the word "scalar," but Defendant has failed to show that this term would not be readily understood by persons of ordinary skill in the art.

The Court therefore hereby construes **"cylindrical accumulation mode basis functions"** to mean **"scalar basis functions that enable description of charge density distribution on the surface of the cylindrical conductor."**

e. **"linearly combine(s) selected cylindrical conduction mode basis functions to approximate a current density distribution over a cross section of a cylindrical conductor"**

| **Plaintiff's Proposed Construction** | **Defendant's Proposed Construction** |
|---|---|
| Plain meaning<br><br>In the alternative:<br>Calculate a weighted sum of the selected conduction mode basis functions to approximate the current density distribution over a cross section. | Calculate a weighted sum of the selected conduction mode basis functions to approximate the current density distribution over a cross section. A weighted sum multiplies each basis function by a number (not a basis function) and then sums. A cross section is a plane perpendicular to the conductor's long axis. |

(Dkt. #74 at p. 16; Dkt. #79 at p. 21; *see* Dkt. #72, Ex. A at p. 34). The parties submit that this term appears in Claims 1, 7, and 13. (Dkt. #87 at p. 2).

i. *The Parties' Positions*

Plaintiff argues that "linearly combine(s)" and "cross section" "had and have a well-known meaning to one of ordinary skill in the art, and a skilled artisan would have understood the '232 patent to use these terms in accordance with their plain meaning." (Dkt. #74 at p. 16). Plaintiff also argues that "Mentor's construction is unwieldy and would be unnecessarily confusing to a jury, especially the last two sentences." (*Id.*)

Defendant responds that "[t]his mathematical phrase must be construed to ensure jurors understand it." (Dkt. #79 at p. 21). For example, Defendant argues that "[w]hile jurors will have heard of 'cross section,' the Court must construe it to ensure they know its correct mathematical meaning." (*Id.* at p. 22).

Plaintiff replies that Defendant's proposed explanation of "weighted sum" is confusing and unnecessary, and "E-System does not dispute that a linear combination involves multiplying (in this context) a basis function by a number." (Dkt. #80 at p. 9). Plaintiff also argues that Defendant's proposal that a "cross section" must be perpendicular is narrower than the ordinary meaning, and Plaintiff submits that Defendant's expert "declined to opine that any technical reason warrants Mentor's construction." (*Id.* at p. 10).

ii. *Analysis*

Plaintiff has no substantive opposition to the first portion of Defendant's proposed construction, as evinced by Plaintiff submitting identical language as an alternative proposed construction.

Plaintiff opposes Defendant's proposal that "[a] weighted sum multiplies each basis function by a number (not a basis function) and then sums" because the term "weighted sum" does not appear in the claim. Plaintiff argues that "[t]he Court should not construe this well-known term, and instead allow the parties to provide whatever elaboration they desire through expert testimony." (Dkt. #74 at p. 17). In general, "only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy." *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999). Indeed, Defendant's expert has agreed that linearly combining has had a well-known meaning in the relevant art at the relevant times. (Dkt. #74, Ex. A, Sept. 12, 2018 Nagel dep. at 128:21–129:5).

Here, however, the parties have presented a dispute as to whether linearly combining can include weighting a basis function by multiplying by another basis function. Defendant's expert has persuasively opined that "you can't have a product of two basis functions because that would be a non-linear function." (Dkt. #79, Ex. D, Sept. 21, 2018 Nagel dep. at 123:24–125:1; *see id.* at

122:19–25 (similar); *see also id.* at 154:10–24 ("The important thing is that if P is a basis function that does not mean that P squared is a basis function."); *id.* at 180:7–9 ("A non-linear combination of basis functions does not give you a valid basis function.")). An extrinsic technical dictionary submitted by Defendant provides further support: "A linear combination of two or more quantities is a sum of the quantities, each multiplied by a constant (not all the constants being zero)." (Dkt. #79, Ex. Q, *Mathematics Dictionary* 229 (4th ed. 1976)).

As to Defendant's proposal that "[a] cross section is a plane perpendicular to the conductor's long axis," Plaintiff argues that Defendant has not shown that a cross-section could not be taken at some angle other than perpendicular. Plaintiff's argument finds support in disclosures regarding a "circular cross-section" ('232 Patent at 3:18 & 6:6), which implies that cross-sections are not necessarily circular. *Cf. Phillips*, 415 F.3d at 1314 ("the claim in this case refers to 'steel baffles,' which strongly implies that the term 'baffles' does not inherently mean objects made of steel"). Defendant's expert has opined: "[I]f it were sliced at an angle, that would not be a cross section. I guess that would be called a section." (Dkt. #79, Ex. D at 118:12–18). On balance, however, this and other evidence cited by Defendant fails to adequately support Defendant's narrow interpretation. (*See, e.g.*, '232 Patent at 3:14–18, 7:6–11, 11:29–33 & Figs. 2 & 4; *see also* Dkt. #79, Ex. M at ESD-00000417–18, Ex. N at 6 & Ex. O at MENT-ESD_00005721). To the extent that this narrow interpretation appears as part of disclosed embodiments, such as illustrated in Figure 2 of the '232 Patent, this is a specific feature of particular embodiments that should not be imported into the claims. *See Phillips*, 415 F.3d at 1323.

The Court therefore hereby construes **"linearly combine(s) selected cylindrical conduction mode basis functions to approximate a current density distribution over a cross section of a cylindrical conductor"** to mean **"calculate a weighted sum of the selected**

**conduction mode basis functions to approximate the current density distribution over a cross section. A weighted sum multiplies each basis function by a number (not a basis function) and then sums."**

f. **"linearly combine(s) selected cylindrical accumulation mode basis functions to approximate a charge density distribution over the cross section of the cylindrical conductor"**

| **Plaintiff's Proposed Construction** | **Defendant's Proposed Construction** |
|---|---|
| Plain meaning<br><br>In the alternative:<br>Calculate a weighted sum of the selected accumulation mode basis functions to approximate the charge density distribution over a cross section. | Indefinite |

(Dkt. #74 at p. 18; *see* Dkt. #72, Ex. A at pp. 44–45; *see also* Dkt. #79 at pp. 5–13; Dkt. #87 at pp. 2–3). The parties submit that this term appears in Claims 1, 7, and 13. (Dkt. #87 at pp. 2–3).

i. *The Parties' Positions*

Plaintiff argues that this term presents the same issues regarding "linearly combine(s)" and "cross section" as presented regarding the term "linearly combine(s) selected cylindrical conduction mode basis functions to approximate a current density distribution over a cross section of a cylindrical conductor," which is addressed above. (Dkt. #74 at p. 18). Plaintiff also argues that Defendant's indefiniteness arguments should be rejected because "'to approximate charge density distribution' acts as an adverbial infinitive phrase describing why the CAMBFs are linearly combined," and "this does not require that the resulting approximation have any particular degree of accuracy." (*Id.* at p. 20). Further, Plaintiff argues that Defendant has not demonstrated that the claim language is internally inconsistent. (*See id.* at pp. 20–23).

Defendant responds that "[t]his claim element is internally inconsistent and inconsistent with the specification, making it nonsensical to a skilled artisan." (Dkt. #75 at p. 5). Defendant argues that this claim language "is internally inconsistent primarily because it recites combining *surface* functions (accumulation mode basis functions) that have no meaning inside a conductor, to approximate values *inside* the conductor." (*Id.* at p. 8).

Plaintiff replies that "capturing charge density at the surface readily enables approximation of charge density distribution over the cross section." (Dkt. #80 at p. 4).

ii. *Analysis*

Above, the Court construes "cylindrical accumulation mode basis functions" as referring to charge density distribution *on the surface* of a cylindrical conductor. The present disputed term, by contrast, recites "a charge density distribution *over the cross section* of the cylindrical conductor." Defendant argues that this inconsistency renders the claims indefinite.

Plaintiff has cited authority that "[i]ndefiniteness is a legal determination; if the court concludes that a person of ordinary skill in the art, with the aid of the specification, would understand what is claimed, the claim is not indefinite." *Freeny v. Apple Inc.*, No. 2:13-CV-361, 2014 WL 4294505, at *4 (E.D. Tex. Aug. 28, 2014) (Bryson, J., sitting by designation). Also, as Plaintiff has emphasized, "[i]ndefiniteness must be proven by clear and convincing evidence." *Sonix*, 844 F.3d at 1377.

Defendant has submitted evidence as to indefiniteness, including evidence in the form of expert testimony evaluating the claims and the specification from the perspective of a person of ordinary skill in the art. (*See* Dkt. #79, Ex. D, Sept. 21, 2018 Nagel dep. at 40:13–42:19 (discussing level of ordinary skill in the art)).

Defendant's expert has opined that cylindrical accumulation mode basis functions cannot provide information about charge density distribution for the interior of a cross section. (*See id.* at 139:11–140:5 ("[T]hose functions won't have any meaning in the inside of the conductor. . . . You're not getting a distribution over a cross section because those functions can't calculate that. They don't have that capability. They're only good at the surface."); *see also id.* at 143:3–22 ("So it's per unit volume if you're in the middle of the conductor. If all of the charge is on the surface of the conductor, then we can approximate it as being some very small compressed - - some very small value delta L, and just talk about the charge per unit area of the surface of the conductor and not worry about how deep it goes.") & 144:7–8 ("you can't calculate it as an area in the middle of the conductor")).

Plaintiff has not submitted opinions of any expert of its own to rebut the opinions of Defendant's expert in this regard.

Further, Plaintiff has not argued that the claim language contains an error or that any correction is appropriate. *See Novo Indus., LP v. Micro Molds Corp.*, 350 F.3d 1348, 1354 (Fed. Cir. 2003) (judicial correction of an error in a patent may be available "only if (1) the correction is not subject to reasonable debate based on consideration of the claim language and the specification and (2) the prosecution history does not suggest a different interpretation of the claims"). At the November 27, 2018 hearing, Plaintiff confirmed its position that there is no error.

Plaintiff has instead argued: (1) the claims are not limited to a "good" conductor and, therefore, there may be a charge density distribution within the conductor; (2) even for an ideal conductor, charge density within the conductor is not undefined but rather is simply zero; (3) determining charge density at the surface can serve as an approximation of charge density

distribution over the cross section; and (4) the claims do not require any particular degree of accuracy for this approximation. (*See* Dkt. #80 at pp. 4–5 & 9; *see also* Dkt. # 74 at pp. 19–23).

Plaintiff's arguments fail because the Court, above, construes "cylindrical accumulation mode basis functions" as describing charge density distribution only on the surface, not for the cross section. Under the Court's construction, the above-cited opinions of Defendant's expert demonstrate that the claims are indefinite.[6]

At the November 27, 2018 hearing, Plaintiff argued that Equation 13 in column 7 of the '232 Patent sets forth that the charge density distribution is defined as being zero everywhere other than at the surface of the conductor. Plaintiff also suggested that Equation 13 could be modified to calculate charge density at any radius, not just at the surface. Further, Plaintiff argued that one can know everything there is to know about the charge density for a cross-section of a good conductor by knowing only the surface charge density because the interior has no charge. Alternatively, Plaintiff argued that even if the claimed invention yields inaccurate results for the interior, this would not render the claims indefinite. Plaintiff repeatedly emphasized that the claims do not require any particular degree of accuracy.

Perhaps these attorney arguments presented by Plaintiff might have been sufficient under the pre-*Nautilus* standard that a claim is indefinite only if it is "insolubly ambiguous" or "not amenable to construction." *See, e.g., Datamize*, 417 F.3d at 1347. As noted above, however, Defendant's unrebutted expert has opined that cylindrical accumulation mode basis functions cannot provide any information at all about charge density distribution for the interior of a cross section. Plaintiff has not submitted any expert of its own to explain and support Plaintiff's

[6] *See Icon Health & Fitness, Inc. v. Polar Electro Oy*, 656 F. App'x 1008, 1015–16 (Fed. Cir. Aug. 8, 2016) (affirming reliance on expert testimony as to indefiniteness).

arguments.[7] At best, Plaintiff has shown that the claims might be "amenable" to some possible interpretation. *Id.* This is insufficient. The evidence presented, including the above-cited opinions of Defendant's expert as well as the above-discussed evidence regarding the term "cylindrical accumulation mode basis functions," amounts to clear and convincing evidence that the claims fail to "inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus*, 134 S. Ct. at 2129.

Although Plaintiff has highlighted that "a construction that renders the claimed invention inoperable should be viewed with extreme skepticism," *AIA Eng'g Ltd. v. Magotteaux Int'l, S/A*, 657 F.3d 1264, 1278 (Fed. Cir. 2011), the proper construction of "cylindrical accumulation mode basis functions" is set forth above. Plaintiff has identified no legal principle that would warrant discounting the compelling claim construction evidence so as to avoid inoperability or indefiniteness.[8]

Thus, although the individual words of this disputed term may be understandable, this term as a whole lacks any reasonably certain meaning. *See Nautilus*, 134 S. Ct. at 2129 (requiring "reasonable certainty"). This term therefore renders the claims indefinite. *See GE Lighting Solutions, LLC v. Lights of Am., Inc.*, 663 F. App'x 938, 940–41 (Fed. Cir. Oct. 27, 2016)

[7] Plaintiff asserted in its briefing and at the November 27, 2018 hearing that the testimony of Defendant's own expert supports Plaintiff's arguments against indefiniteness. Read as a whole, the relevant testimony of Defendant's expert supports Defendant's arguments, not Plaintiff's. In other words, although Plaintiff has argued that the opinions of Defendant's expert have been rebutted by Defendant's expert's own testimony, Plaintiff has not persuasively demonstrated that this is so. (*Compare, e.g.*, Dkt. #80 at p. 5 ("Dr. Nagel effectively acknowledged that surface-oriented CAMBFs provide the only data needed to approximate charge density distribution over a cross section when he agreed that if charge density over a cross section were represented by color (with red representing a lot of charge and blue representing no charge), 'the rim of the conductor—surface at the conductor—would be red and everything else would be blue.' Since you do not need to calculate charge at the interior to know that it is zero, you only need to know just how 'red' is the surface.") (citing Dkt. #80, Ex. A, Sept. 21, 2018 Nagel dep. at 110:17–111:7) *with* Dkt. #79, Ex. D, Sept. 21, 2018 Nagel dep. at 139:11–140:5 ("You're not getting a distribution over a cross section because those functions can't calculate that. They don't have that capability. They're only good at the surface.")).

[8] Plaintiff has also cited *Mobile Telecommunications Technologies, LLC v. Amazon.com, Inc.*, which found that the defendant "failed to demonstrate that the existence of superfluous conditional steps necessarily renders a claim indefinite." No. 2:13-CV-883-JRG-RSP, 2014 WL 5766050, at *10 (E.D. Tex. Nov. 5, 2014) ("*MTel*"). Plaintiff has not shown how *MTel* is analogous. The claim limitation here at issue is not an alternative or a conditional step.

(affirming construction of "elongated" and also affirming finding that claims were indefinite because "a person of ordinary skill in the art could not be reasonably certain of the claim scope in light of the term 'elongated'"); *see also Trs. of Columbia Univ. v. Symantec Corp.*, 811 F.3d 1359, 1367 (Fed. Cir. 2016) ("The claims are nonsensical in the way a claim to extracting orange juice from apples would be, and are thus indefinite.").

The Court therefore hereby finds that **"linearly combine(s) selected cylindrical accumulation mode basis functions to approximate a charge density distribution over the cross section of the cylindrical conductor"** is **indefinite**.

g. **"constructs equivalent circuit equations"**

| **Plaintiff's Proposed Construction** | **Defendant's Proposed Construction** |
|---|---|
| Plain meaning<br><br>In the alternative:<br>Constructs a set of equations to model a circuit having cylindrical conductors. | Determines a set of linear equations between currents and voltages in a circuit model of two or more conductors. |

(Dkt. #74 at p. 23; Dkt. #79 at p. 23; *see* Dkt. #72, Ex. A at p. 53). The parties submit that this term appears in Claims 1 and 13. (Dkt. #87 at p. 3).

i. *The Parties' Positions*

Plaintiff argues that the words that make up this term are used in accordance with their ordinary and customary meaning. (Dkt. #74 at p. 23). Plaintiff also argues that "to the extent there is any confusion of what this phrase might mean in the abstract, that confusion disappears when one reads the claims, which explain that one constructs equivalent circuit equations 'from the selected cylindrical conduction and accumulation mode basis functions.'" (*Id.*)

Defendant responds that "[t]his phrase must be construed because the parties dispute which of its meanings in the art applies . . . and it is facially ambiguous to a juror: does 'equivalent'

modify the noun 'circuit equations' or does 'equivalent circuit' modify the noun 'equations'?" (Dkt. #79 at p. 23). Defendant argues that "[t]he intrinsic evidence defines the phrase as Mentor proposes." (*Id.*)

Plaintiff replies that "Mentor's only support [for proposing 'linear equations'] is a statement from the inventors' *provisional* application that plainly describes an exemplary embodiment . . . ." (Dkt. #80 at p. 10). As to Defendant's proposal of construing the word "constructs," Plaintiff argues that "since the claim preambles specifically refer to *modeling* a circuit rather than *building* a physical circuit, [Defendant's] far-fetched concern does not warrant redefining claim terms." (*Id.*)

ii. *Analysis*

Claim 1 of the '232 Patent recites (emphasis added):

> 1. Electrical modeling apparatus for electrically modeling three-dimensional circuit structures having cylindrical conductors, comprising:
> a computer; and
> software that runs on the computer that comprises:
> a first code segment that defines a plurality of cylindrical conduction mode basis functions constructed on cylindrical coordinates;
> a second code segment that defines a plurality of cylindrical accumulation mode basis functions constructed on cylindrical coordinates;
> a third code segment that linearly combines selected cylindrical conduction mode basis functions to approximate a current density distribution over a cross section of a cylindrical conductor;
> a fourth code segment that linearly combines selected cylindrical accumulation mode basis functions to approximate a charge density distribution over the cross section of the cylindrical conductor; and
> a fifth code segment that *constructs equivalent circuit equations* from the selected cylindrical conduction and accumulation mode basis functions.

Defendant has highlighted disclosure in the provisional patent application to which the '232 Patent claims priority, namely United States Provisional Patent Application No. 60/982,505, that a particular "set of equivalent circuit equations is obtained." (Dkt. #79, Ex. M at p. 9 of 16 (ESD-00000418)). First, the '232 Patent does not incorporate this provisional patent application,

and Defendant has not shown that this provisional application is necessarily intrinsic rather than extrinsic evidence. *See dunnhumby USA, LLC v. emnos USA Corp.*, No. 13-CV-0399, 2015 WL 1542365, at *8–*11 (N.D. Ill. Apr. 1, 2015) (collecting cases and finding that a provisional patent application not incorporated by reference was extrinsic evidence rather than intrinsic evidence). Second, even if the provisional application were deemed to be intrinsic evidence, Defendant has not shown how the provisional application purportedly "defines" the term here at issue. (Dkt. #79 at p. 23).

Defendant has not sufficiently justified limiting the disputed term to "linear equations between currents and voltages." Even a technical dictionary definition cited by Defendant itself refers to merely "[a]n arrangement of circuit elements that has characteristics, over a range of interest, electrically equivalent to those of a different circuit or device." (Dkt. #74, Ex. C at p. 32 (citing *IEEE Standard Dictionary of Electrical and Electronics Terms* (3d ed. 1984) (MENT-ESD_00090793-6)).[9] The other extrinsic documents cited by Defendant, such as presentation slides bearing the names of the named inventors, do not compel otherwise. (*See* Dkt. #79, Ex. R at MENT-ESD_00001014 & Ex. S at MENT-EST_00011501; *see also id.*, Ex. T at MENT-ESD_00089552).

Defendant's own expert has acknowledged that the term "equivalent circuit" has had a known meaning in the art at the relevant times and that this meaning is not limited to "linear." (*See* Dkt. #74, Ex. A, Sept. 21, 2018 Nagel dep. at 157:16–159:4 ("There's no hard clad rule that says that an equivalent circuit has to be linear."); *see also id.* at 156:13–157:1 ("people would come up with equivalent circuits that made - - that would simplify things")). Further, surrounding

[9] (*See* Dkt. #79, Ex. J, *Modern Dictionary of Electronics* 348 (6th ed. 1984) ("equivalent circuit — 1. An arrangement of common circuit elements that has characteristics over a range of interest electrically equivalent to those of a different or more complicated circuit or device. 2. A simplified circuit which has the same response to changing voltage and frequency as a more complex circuit. Used to facilitate mathematical analysis")).

claim language provides context by reciting "a fifth code segment that constructs equivalent circuit equations *from the selected cylindrical conduction and accumulation mode basis functions*." Thus, no construction is necessary in this regard. *See Vivid Techs.*, 200 F.3d at 803.

Also, Defendant has not sufficiently supported its proposal of referring to "a circuit model of two or more conductors." The claim preamble refers to "cylindrical conductors," plural, but the body of the claim refers to a "cylindrical conductor," singular, and the parties have not presented any dispute as to whether the preamble is limiting. The Court therefore rejects Defendant's proposal of "two or more conductors."

Further, Defendant has *not* shown that the word "constructs" would likely be misinterpreted as requiring physical construction. Instead, the disputed term itself, particularly in the context of the rest of the above-reproduced claim, is sufficiently clear that the disputed term refers to equations rather than any physical structure.

Finally, Defendant has not shown any relevant ambiguity as to whether "equivalent" modifies "circuit equations" or "equivalent circuit" modifies "equations." (Dkt. #79 at p. 23).

The Court therefore hereby expressly rejects Defendant's proposed construction, and no further construction is necessary. *See Finjan*, 626 F.3d at 1207; *Summit 6*, 802 F.3d at 1291.

The Court accordingly hereby construes **"constructs equivalent circuit equations"** to have its **plain meaning**.

h. **"construct an equivalent resistance, inductance, conductance, capacitance (RLGC) circuit"**

| **Plaintiff's Proposed Construction** | **Defendant's Proposed Construction** |
|---|---|
| Plain meaning<br><br>In the alternative:<br>Construct a set of equations that models a circuit that includes resistance, inductance, conductance, and capacitance. | Calculate component values for resistance, inductance, capacitance, and conductance, that model the 3D circuit. Conductance is the current that flows between two conductors divided by the voltage between them.[10] |

(Dkt. #74 at p. 24; Dkt. #79 at p. 24; *see* Dkt. #72, Ex. A at p. 61). The parties submit that this term appears in Claim 7. (Dkt. #87 at p. 3).

i. *The Parties' Positions*

Plaintiff argues that this term presents issues similar to the term "constructs equivalent circuit equations," which is addressed above. (Dkt. #74 at p. 24).

Defendant responds that construction is necessary because the parties dispute the ordinary technical meaning of this term. (Dkt. #79 at p. 24). Defendant also submits that "a juror might misunderstand 'construct . . . circuit' to require making a physical circuit, which is not required." (*Id.*)

ii. *Analysis*

Claim 7 of the '232 Patent recites (emphasis added):

> 7. A method, operable on a digital computer, for electrically modeling three-dimensional circuit structures having cylindrical conductors, comprising:
> instructing the digital computer to define a plurality of cylindrical conduction mode basis functions constructed on cylindrical coordinates;
> instructing the digital computer to define a plurality of cylindrical accumulation mode basis functions constructed on cylindrical coordinates;
> instructing the digital computer to linearly combine selected cylindrical conduction mode basis functions to approximate a current density distribution over a cross section of a cylindrical conductor;

[10] Defendant previously proposed: "Calculate component values that model the 3D circuit, including resistance, inductance, capacitance, and conductance. Conductance is the current that flows between two conductors divided by the voltage between them." (Dkt. #72, Ex. A at p. 61).

> instructing the digital computer to linearly combine selected cylindrical accumulation mode basis functions to approximate a charge density distribution over the cross section of the cylindrical conductor; and
>
> instructing the digital computer to *construct an equivalent resistance, inductance, conductance, capacitance (RLGC) circuit* from the selected cylindrical conduction and accumulation mode basis functions.

The specification discloses:

> The previously defined cylindrical conduction and accumulation mode basis functions are inserted into the mixed potential integral equation and forms [*sic*] equivalent voltage equations, which include modal partial impedances (series resistances and inductances) and admittances (parallel capacitors and conductances) of each conductor. The formulation procedure is discussed below, including calculation of impedances and admittances and construction of an equivalent network.

'232 Patent at 7:63–8:1.

As discussed above regarding the term "constructs equivalent circuit equations," the word "construct" does not requiring building a physical structure. This is readily apparent on the face of the claim. Even though the present disputed term refers to a "circuit" rather than "circuit equations," surrounding claim language provides sufficient context such that "construct" need not be construed.

Further, the parties have not presented any dispute regarding the meanings of the constituent terms "resistance," "inductance," "conductance," or "capacitance." As to Defendant's proposed explanation of conductance, Defendant's own expert "do[es]n't know why I - - why we felt the need for me to say define what conductance was. I don't recall." (Dkt. #74, Ex. A, Sept. 21, 2018 Nagel dep. at 164:12–14). Defendant's expert also does not think that conductance is any more or less understood by a person of skill in the art than resistance, inductance, or capacitance. (*Id.* at 164:15–18). Thus, no construction is necessary in this regard. *See Vivid Techs.*, 200 F.3d at 803.

Finally, Defendant proposes referring to a "3D circuit," but even though the recited "cylindrical conductor" is three-dimensional, Defendant has not sufficiently supported its assertion that an "equivalent . . . circuit" is necessarily three-dimensional.

The Court therefore hereby expressly rejects Defendant's proposed construction, and no further construction is necessary. *See Finjan*, 626 F.3d at 1207; *see also Summit 6*, 802 F.3d at 1291.

The Court accordingly hereby construes **"construct an equivalent resistance, inductance, conductance, capacitance (RLGC) circuit"** to have its **plain meaning**.

## CONCLUSION

The Court adopts the constructions set forth in this opinion for the disputed terms of the patents-in-suit. The parties are ordered that they may not refer, directly or indirectly, to each other's claim construction positions in the presence of the jury. Likewise, the parties are ordered to refrain from mentioning any portion of this opinion, other than the actual definitions adopted by the Court, in the presence of the jury. Any reference to claim construction proceedings is limited to informing the jury of the definitions adopted by the Court.

**SIGNED this 17th day of December, 2018.**

AMOS L. MAZZANT
UNITED STATES DISTRICT JUDGE