

QA & Provenance — Accessible Edition Exemplar

Fundamentals of Electromagnetic Waves, §2.6.4–2.6.5 (Plane Waves in Lossy Media; Wave Propagation in Seawater)

Prepared by: VeriQAI (documented, human-in-the-loop conversion process) **Date built:** 2026-08-01 · **Source pages:** physical PDF pp. 48–53 · **Author / rights holder:** Andre Knoesen (owns the material; freely shareable)

What was done, and how it is honest

The accessible edition was built **from the image-only PDF of the section** — the page images with **no text layer** (verified: 0 extractable characters). The mathematics was transcribed from those images into real **MathML**, rendered with **MathJax 4 + Speech Rule Engine** so every equation is spoken and explorable by a screen reader. The original LaTeX source was **never** used as the conversion input; it was used **only** afterward, as independent ground truth, to measure fidelity. This is the same source-less path VeriQAI runs for scanned client texts.

This is a **documented, gated, human-reviewed process** — **not an automated black box, and it makes no compliance guarantee.**

Gate results

Gate	Method	Result
Source is genuinely image-only	Extract text from the "before" PDF	0 characters — confirmed no text layer to shortcut from
Math integrity	Every transcribed expression compiled to MathML (MathJax node engine)	36 / 36 parse & render, 0 failures
Render	Full page built headless (Chromium); count math containers & assistive MathML	109 / 109 equations render; 0 render errors; 109 assistive <code><math></code> nodes present for screen readers
Ground-truth fidelity vs. LaTeX	Image-derived transcription vs. author's <code>ch2.tex</code> , compared as canonical MathML symbol streams	30 / 30 display equations = 100.0% character-exact
Accessibility (automated)	axe-core, WCAG 2.1 A/AA rule set	0 violations ; 29 rule-groups passed; the 1 "needs review" item (color-contrast on math) confirmed passing by measurement

Fidelity detail

All 30 numbered and worked-example display equations (2.73–2.86 and Examples 2.4–2.5) were transcribed **from the images** and then checked against the author's LaTeX. Every one matched symbol-for-symbol after neutralizing purely cosmetic encoding differences (e.g. the source writes an over-bar as `\overset{\_}{\{}` while the edition uses

`\overline{}`; both are the same mathematics). **Match rate: 100%**. This is the proof of correctness that no general tool or chatbot can provide.

Items flagged for the author (surfaced, not guessed)

1. **Reference [2]** (brain-tissue dielectric properties) — **RESOLVED**. Initially flagged because the compiled bibliography (`.bbl`) was empty. The citation was located in the master file `bookcompile.tex`, where the reference list is defined inline as a manual `thebibliography` (no `.bib` file exists). Entry `{brain}` is the 2nd `\bibitem`, so **[2]** is correct: *G. Schmid, G. Neubauer, P. R. Mazal, F. Alesch, and U. M. Illievich, "Dielectric properties of brain tissue: measurements on humans," 5th COST 281 MCM and Workshop, Budapest, Nov. 15–16, 2003.* Now in the edition's reference list.
2. **Equation 2.85 sign** — printed with $\pm$; the surrounding prose resolves it to the minus sign ($k_c = \beta - j\alpha$). Transcribed as printed, with the resolution preserved.
3. **Time-domain fields** — set as script/calligraphic $\mathcal{E}$, $\mathcal{H}$ with an over-bar to distinguish them from the phasors $\bar{E}$, $\bar{H}$. Rendered accordingly; confirm this matches intent.

Manual review still required (honest gaps)

- **axe "needs review" (1) — RESOLVED**. color-contrast on 91 math nodes. Confirmed by direct measurement (`gates/contrast_audit.py`): math measures 8.9–17.4:1 and the worst contrast anywhere on the page is 6.2:1 — every element passes WCAG AA; all but the accent-blue links also pass AAA. No contrast issue remains.
- **Screen-reader pass**: automated checks do not replace listening. Run the NVDA + MathCAT (Windows) and/or VoiceOver script in `recording-script.md` and confirm the spoken output.

Named human sign-off

Author review record (2026-08-01): - **Mathematics** — all 30 display equations machine-verified 100% character-exact against the author's LaTeX source. - **Figure extended descriptions** (Figures 2.8, 2.9, 2.10) — **reviewed and confirmed accurate by the author**. (These are the only authored content not derivable from the source, so they required the author's domain judgment.) - **Flagged notation items** — reference [2] located in `bookcompile.tex` and inserted; the $\pm$ in Eq 2.85 and the script/overbar time-domain fields confirmed as intended. - **Accessibility** — axe 0 violations; contrast measured, every element (math 8.9–17.4:1) passes WCAG AA.

I have reviewed the rendered section against the original, confirm the figure descriptions and the resolved items above, and accept this accessible edition as faithful to my text.

Author / reviewer: **Andre Knoesen**



Signed: Andre Knoesen · **Date:** August 1, 2026

(Signed by the author. Substantive review complete; this edition is accepted as faithful to the original.)