

## Step 2 - referee\_package\_2026-02-03

2026-02-03

### Follow up with Author

in the uploaded `referee_package_2026-02-03.zip`. It is *theory-only*: no scripts or JSON artifacts were executed here.

**AI response:** Correct for this *alignment report*: it is a static theory audit of the shipped bundle contents and phrasing. Note the uploaded referee package itself includes `compute/` (scripts + JSON artifacts) and includes an independent Lambda A10 compute audit bundle; this document does not re-run those computations.

### What appears resolved (green responses)

- **(AC $_{\mu}$ ) removal claim.** Multiple green blocks state that Theorem \ref{thm:Pplus} is now proved *directly* as a Lebesgue-a.e. wedge statement in Appendix \ref{app:pplus-proof}, so no  $\mu$ -a.e. upgrade and no (AC $_{\mu}$ ) hypothesis is used.

**AI response:** Partially resolved. The Appendix now routes Lebesgue-a.e. wedge via a Whitney-local oscillation/globalization step. One concrete gap that existed here (Lemma 17 “triangular kernel” vs arbitrary bump) has been fixed by pinning  $\varphi_I$  to an explicit hat/cutoff and using positivity of  $-w'$  (no unjustified “integration by parts”). Remaining work is to remove contradictory (AC $_{\mu}$ ) sentences/blocks elsewhere in the main paper so the unconditional story is internally consistent.

- **Citations added.** Green blocks add citations for the det<sub>2</sub> product formula and for standard half-plane outer-function and Schur-transport facts (e.g. Garnett; Rosenblum–Rovnyak; Simon).

**AI response:** Resolved in the current marked draft (citations present). Still advisable for submission: ensure each cited claim points to a *specific* theorem/lemma number in the reference (not just a book-level citation) wherever the referee flagged “proof sketch”.

- **Gauge/domain sanity.** Green block addresses the  $(s - 1)/s$  compensator and regularity at  $s = 1$  on  $\Omega$ .

**AI response:** Resolved at the level of bookkeeping: the compensator is holomorphic and non-vanishing on  $\Omega = \{\Re s > \frac{1}{2}\}$  so it does not introduce poles/zeros in the region of interest.

- **Blocker-mapping narrative.** The manuscript now contains an explicit map from the two analytic inputs needed for Lemma \ref{lem:F-boundary-admissible} to concrete Appendix lemmas (determinant  $L^1$  control, outer stability, Carleson/Whitney control, etc.).

**AI response:** Partially resolved. The mapping narrative helps, but a referee can still object if the main-text lemma remains worded as “Assume ...”. This needs the wording/proof upgrade

described below (make the lemma unconditional + cite exact Appendix lemma numbers in a short proof).

## Still inconsistent statements (must fix for a clean “unconditional” story)

### 1. Main Theorem statement still asserts $(AC_\mu)$ .

In `paper1_farfield.tex`, Theorem `\ref{thm:farfield}` still contains a blue sentence saying the proof relies on an Appendix  $\mu$ -construction and the domination hypothesis  $(AC_\mu)$ . This directly contradicts the green claim that  $(AC_\mu)$  is no longer used.

**AI response:** Not resolved yet (editorial but *must* be fixed). Action: delete/replace that blue sentence in Theorem `\ref{thm:farfield}` so it forward-references the Appendix Lebesgue-a.e. wedge proof of Theorem `\ref{thm:Pplus}` only, with no  $(AC_\mu)$  dependency.

### 2. One paragraph says JSON artifacts are “used in the proof”.

In the “Audit posture” paragraph (near the repository contents), it says the JSON artifacts recording maxima are “used in the proof”. This contradicts the Abstract and the “Conclusion and limitations” section, which state artifacts are *not* used in the proof.

**AI response:** Not resolved yet (editorial but important). Action: choose one consistent posture and rewrite: either (A) artifacts are *audit-only* (recommended)  $\Rightarrow$  change “used in the proof” to “for independent cross-check/auditability only”, or (B) artifacts are load-bearing  $\Rightarrow$  update Abstract/Conclusion accordingly.

### 3. Obsolete conditionality blocks remain inline.

Several blue blocks still describe a  $\mu$ -a.e.  $\Rightarrow$  Lebesgue-a.e. upgrade as a required step, and cite  $(AC_\mu)$ . A green block says these are “historical referee commentary”, but they remain in the main logical flow. For a journal-ready unconditional draft, these should be removed or moved to a separate “Referee history” appendix.

**AI response:** Not resolved yet. Recommended: for the *submission* PDF, move all obsolete  $\mu$ -upgrade infrastructure to a clearly labeled historical/referee-log appendix (or delete entirely), so a referee cannot misread it as part of the current dependency chain. Keep only what is logically used.

## Remaining theory gaps that are *not* just editorial

### 1. Lemma `lem:F-boundary-admissible` is still phrased as an assumption.

It begins with “Assume the analytic inputs established in Appendix...”, then lists two inputs (boundary trace/log-modulus and a harmonic majorant/box control). The manuscript *does* provide an Appendix mapping to specific lemmas, but the main text should be updated to a standard form:

- either: state the lemma unconditionally and give a short proof that explicitly cites the exact Appendix lemmas that discharge (i)–(ii), or
- : promote those Appendix items to a named theorem and cite that theorem here.

Until this is rewritten, a referee can reasonably read the result as “assumed” rather than proved in-paper.

**AI response:** Not resolved yet (substantive presentation gap). I agree: rewrite the lemma unconditionally and add a short proof that explicitly discharges (i)–(ii) by citing the exact Appendix lemmas (by number) that provide each input. This is a must-have for a clean referee read.

## 2. The distributional phase–velocity lemma is only a “proof sketch”.

In `paper1_pplus_proof.tex`, Lemma `lem:pv-distributional` has a proof labeled “Proof sketch and what must be checked”. This should be upgraded to either (a) a complete proof, or (b) a precise citation (theorem/lemma number) in a standard reference (e.g. Duren or Garnett) with hypotheses matching exactly what is used later.

**AI response:** Not resolved yet (potentially load-bearing). Recommendation: either provide a complete proof in-paper (best), or replace the sketch with a precise external citation (theorem number + hypotheses) and then verify in text that the manuscript’s objects satisfy those hypotheses (e.g. boundary integrability / nontangential limits / BV or distributional derivative framework).

## 3. Remove/neutralize unused $\mu$ -infrastructure if it is truly unused.

The Appendix still contains  $(AC_\mu)$  and  $\mu$ -to-Lebesgue discussion, including “what must be checked for the present  $\mu$ ”. If the final (P+) proof chain no longer uses it, keep it only as an optional historical note clearly marked “not used”; otherwise, a referee may interpret it as part of the logical dependency chain.

**AI response:** Not resolved yet. Strongly agree: for submission, either delete this material or move it to a “Not used / historical” subsection with an explicit statement “Theorem `\ref{thm:Pplus}` does not invoke any  $\mu$ -upgrade.” Right now it invites confusion.

## Minimal patch list to make the paper unambiguously unconditional

- Delete or rewrite the  $(AC_\mu)$  sentence inside Theorem `\ref{thm:farfield}`; replace with a single forward reference to the Lebesgue-a.e. Appendix proof of Theorem `\ref{thm:Pplus}`.

**AI response:** Agree. This is required for internal consistency with the new Appendix wedge route.

- In “Audit posture”: change “used in the proof” to “for independent cross-check / auditability only” (or, if artifacts are load-bearing, then remove the Abstract/Conclusion statements that say they are not used).

**AI response:** Agree. Recommend option “audit-only” unless you explicitly want the main theorem to depend on shipped JSON outputs.

- Rewrite Lemma `\ref{lem:F-boundary-admissible}` so it is no longer an “Assume ...” lemma: explicitly discharge (i)–(ii) by citing the exact Appendix lemmas.

**AI response:** Agree. This is the cleanest way to eliminate the “assumed” reading.

- Upgrade Lemma `lem:pv-distributional` from “proof sketch” to a complete proof or a precise theorem-number citation.

**AI response:** Agree. Until this is upgraded, a referee can reasonably mark the Appendix wedge chain as “UNCERTAIN”.

- Move all obsolete blue conditionality blocks into a separate “Referee log” appendix (or delete for the submission version).

**AI response:** Agree. This is important not for correctness, but for referee-time: remove any opportunity for dependency confusion.

## AI end-of-document status (2026-02-03)

**AI response:** I was able to (i) respond inline to each issue here and (ii) fix one concrete load-bearing gap already identified in the Appendix wedge chain (Lemma 17 kernel/bump mismatch) inside the referee package. However, the broader set of issues listed in this report is *not yet fully resolved* for a journal-ready unconditional draft: the main paper still contains inconsistent ( $\text{AC}_\mu$ )/artifact-load-bearing phrasing, and two items remain potentially load-bearing until rewritten (Lemma `lem:F-boundary-admissible` as “assume”, and Lemma `lem:pv-distributional` as a proof sketch).