LucidLock: Method Logic Consistency Validator
A System for Automated Detection of Structural Misalignment Between Research Methods and Stated Inquiry

---

🧬 Abstract

A system and method are disclosed for evaluating the internal logical consistency of methods sections in academic documents. The invention, LucidLock Method Logic Consistency Validator, operates as a standalone gate or API-connected module that ingests academic papers, extracts the methods section, and performs a structured analysis to determine whether the described methodology aligns with the stated research question, adheres to logical coherence, and avoids epistemic mismatches such as hidden assumptions, circular reasoning, omitted constraints, or methodological overreach. The system generates a verdict (PASS or FAIL) with a structured HTML report and optional email delivery for auditing, QA, or prepublication review. This validator is designed to function within a broader integrity analysis suite and does not assess factual correctness, ethics, or statistical rigor.

🧾 Claims

1. A system comprising:

- an automated method analysis engine,
- a semantic parser configured to extract the methods section from academic documents,
- and a logic filter designed to assess coherence between stated research goals and methodological procedures.

2. The system of claim 1, wherein the engine evaluates for the presence or absence of:

- method-claim mismatch,
- hidden assumptions,
- circular reasoning,
- constraint omission,

- and epistemic scope overreach.

3. The system of claim 1, wherein the output includes:

- a structured HTML report,
- a binary PASS/FAIL logic verdict,
- and optionally a timestamped delivery via email, messaging service, or academic workflow integration.

4. The system of claim 1, wherein the logic filter includes predefined pattern detection rules and learned semantic models to assess alignment between:

- research questions,
- stated goals,
- described methodologies,
- and acknowledged limitations.

5. The system of claim 1, wherein the validator is deployed as:

- a standalone application,
- a browser-based gate,
- an API endpoint,
- or integrated module in a preprint, journal, or institutional review pipeline.

6. The system of claim 1, wherein document retrieval includes fallback mechanisms to ensure analysis is completed regardless of indexing errors, upload failure, or document corruption.

7. The system of claim 1, wherein the user-facing output explicitly disclaims evaluation of:

- factual truth,
- statistical soundness,

- or ethical review,
  to preserve the validator's structural focus.

📚 Description

Field of the Invention

The invention relates to automated integrity validation of academic documents, specifically the evaluation of **methodological logic** and **epistemic coherence** within research papers, grant proposals, or other formal scholarly outputs.

Background

Current peer review processes often fail to catch internal logical inconsistencies in the methods section of academic works. As AI generation increases document volume and fluency, structural checks on **reasoning alignment** are needed. There is no widely deployed system that flags when research methods:

- do not match the stated question,
- hide assumptions,
- leap over constraints,
- or show circular justification patterns.

Summary

LucidLock Method Logic Consistency Validator addresses this gap by:

- Parsing academic documents for the methods section.
- Evaluating structural consistency from hypothesis to outcome.

- Identifying misalignment between the research question and the experimental or methodological design.
- Generating clear, interpretable PASS/FAIL verdicts with rationale.

The system uses semantic analysis of method statements to:

- flag confounds,
- detect hidden variables or omitted constraints,
- and map whether the claimed knowledge fits the epistemological scope of the chosen method.

The system can operate autonomously or as part of the broader **LucidLock Suite**, which includes Reasoning Structure, Citation Integrity, and Core Inquiry Continuity modules.

Example Use Case

A research paper claims to develop a new algorithm for climate modeling. The method section uses only a small simulation dataset without comparison to empirical data or validation. The LucidLock Method Logic Check flags this as a **method-claim mismatch**, fails the document, and delivers an automated report explaining that the methodology does not support the generality of the conclusions drawn.

Technical Implementation

- The system receives input via webhook, with filename and file ID.
- Text is extracted via linked PDF indexing (e.g., DustTT Connected Data).
- The methods section is semantically parsed for structure, assumption traces, and constraint declarations.
- Verdicts are generated based on matching patterns and logic trees.
- Output is structured in HTML and optionally sent via Gmail or other integrations.

Advantages

- Reduces strain on human reviewers.
- Adds a logic-layer filter before peer review.
- Helps authors catch reasoning breakdowns before submission.
- Improves scientific transparency by surfacing hidden assumptions.
- Immune to surface-level rhetorical fluency or LLM hallucination masking.