

Report on Use of AI Tools

Basic Information

- Contest Name: Mathematical Contest in Modeling/Interdisciplinary Contest in Modeling (MCM/ICM) <Year>
- Team Number: <xxxxxx>
- Selected Problem: <A/B/C/D/E/F>
- Report Language: <English / Chinese + English, etc.>

1. Usage Overview

Tool/Model	Version/Date	Type	Purpose	Usage Location (Section/File)
OpenAI ChatGPT (GPT-5)	<YYYY-MM-DD>	Large Language Model (LLM)/Generative AI	Outline structuring / Polishing / Pseudo-code	<Sec 2.1; Appendix A>
DeepL	<YYYY-MM-DD>	Translation Tool	Full-text translation (Chinese → English)	Entire report
GitHub Copilot	<YYYY-MM-DD>	Code Copilot	Auto-completion / Boilerplate code	<simulation.py>

2. Detailed Records of LLM / Generative AI

2.1 Tool/Model Information

- Tool/Model: OpenAI ChatGPT
- Version/Date + Model Name: <<e.g., Nov 5, 2023 version, ChatGPT-4>
- Usage Method (Optional): <Web / App / API (Application Programming Interface)>
- Purpose: <<e.g., Generating structural ideas, polishing expressions, creating pseudo-code frameworks>
- Where Used: <<e.g., Sec. 2; Sec. 4; Appendix Code>

2.2 Interaction Log

Log #1

- Time: <YYYY-MM-DD HH:MM>
- **Query**

We are practicing for the "2016 MCM Problem B: Space Junk". Please provide 3 possible modeling ideas. For each idea, include: key assumptions, main variables, and core indicators (to evaluate the quality of the solution). Do not fabricate data or citations. Please output in a structured outline.

- **Output**

Idea 1: Orbital Debris Quantity Dynamics (Stratified/Segmented Population Model)

Assumptions: Classify debris by size; collisions generate new debris; debris removal strategies affect the reduction rate of specific classes.

Variables: Quantity of debris in each class, $N_i(t)$; collision rate function; removal rate, $r_i(t)$.

Indicators: Collision risk, stabilization time, cost.

Idea 2: Optimization Model for Intervention Combinations

Decision Variables: Annual removal quantity (by orbit type); budget allocation.

Objective: Minimize the sum of risk-weighted values and costs; Constraints: Budget limits, feasibility.

Idea 3: Agent-Based Simulation

Simulate each target using orbital parameters; events include launch, orbital decay, collision, and removal.

Indicators: Debris growth trend, sensitivity to strategy parameters.

- **Verification and Revision Notes:**

1. We verified: Whether there were unsubstantiated claims/fabricated citations; whether key variables were clearly defined; whether they were consistent with our data/assumptions.
2. We revised: Removed inapplicable assumptions; replaced "verbal descriptions" with our own derivation and simulation results.
3. Final Usage: Only referenced the structure; the final model, parameters, and conclusions

were independently developed by the team and are reproducible.

Log #2

- Time: <YYYY-MM-DD HH:MM>
- **Query**

Please polish the following English paragraph into clearer and more concise academic expression. Keep the technical meaning unchanged and do not add new facts.

[Paste our original paragraph here]

- **Output**

We model the water temperature as a balance between heat input from the faucet and heat loss to the environment.

Assuming the water is well-mixed, the temperature evolves according to ...

- **Verification and Revision Notes:**

1. We cross-checked each sentence: Whether new conclusions/data were introduced; whether terminology was consistent; whether formulas and symbols remained unchanged.
2. Rewrote expressions that were inconsistent with our derivations, and prioritized our own derivations.

3. Translation Tools

- Tool: DeepL
- Version/Date: <YYYY-MM-DD>
- Usage Statement:
 - Full-text Translation: Used DeepL to translate the entire Chinese report into English. The team manually proofread terminology, grammar, and logical coherence.
 - Proofreading Notes: We manually proofread terminology, grammar, and logical coherence; formulas and symbols remained unchanged.
- Proofreading Notes: We manually proofread terminology, grammar, and logical coherence; formulas and symbols remained unchanged.

4. Code Copilots / Auto-complete / AI Features in Mathematical Software

- Tool: GitHub Copilot

- Version/Date: <YYYY-MM-DD>
- Purpose: Provide auto-completion and boilerplate code suggestions for implementing simulation/optimization code.
- Usage Location: <<e.g., simulation.py; optimizer.ipynb>
- Verification Notes:
 - All code suggested by GitHub Copilot was reviewed, tested, and modified (if necessary) by the team before being included in the final results.

5. Integrity, Verification, and Responsibility Statement

- We have verified the accuracy, validity, and appropriateness of AI-generated content and its citations, and corrected any errors or inconsistencies found.
- We have noted and avoided potential plagiarism risks; traced and verified text and citations that may come from external sources, and made necessary rewrites or citation annotations.