

## Appendix: AI Usage Report

### AI Tools Declaration

In accordance with Springer Nature’s policies on AI-assisted technologies, we declare that AI tools were used during the preparation of this work. Specifically, we employed:

- **Claude Code (claude-opus-4-20250514)**: For code development assistance, mathematical derivations, algorithm exploration, and manuscript preparation. AI assisted in implementing GPU-optimized code, generating visualization scripts, and structuring the paper sections.
- **PlayWright MCP**: For automated web scraping and verification of 80+ research papers, ensuring comprehensive literature coverage and preventing citation errors.
- **Context7 MCP**: For accessing state-of-the-art code implementations and comparing our approach with existing PINN frameworks.

All AI-generated content was carefully reviewed, validated, and substantially modified by the authors. The core algorithmic innovations—including the hybrid Fourier-neural architecture, the counter-intuitive 10-harmonic optimal configuration, and the catastrophic accuracy degradation discovery—are original contributions developed through systematic experimentation and human insight. The breakthrough achievement of  $1.94 \times 10^{-7}$  L2 error resulted from novel architectural design and optimization strategies conceived by the authors. AI tools served primarily as implementation accelerators and verification assistants rather than innovation sources. The authors take full responsibility for the content, accuracy, and scientific validity of this publication.