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PAOS: a fast, modern, and reliable Python package for Physical Optics studies

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Summary

Accurate assessment of the optical performance of advanced telescopes and imaging systems for astrophysical applications is essential to achieve an optimal balance between optical quality, system complexity, costs, and risks.

In this paper, we introduce PAOS, an open-source code implementing physical optics propagation (POP) in Fresnel approximation and paraxial ray-tracing to analyze complex waveform propagation through both generic and off-axes optical systems, enabling the generation of realistic Point Spread Functions across various wavelengths and focal planes.

Developed using a Python 3 stack, PAOS includes an installer, documented examples, and a comprehensive guide. It improves upon other POP codes offering extensive customization options and the liberty to access, utilize, and adapt the software library to the user's application.

With a generic input system and a built-in Graphical User Interface, PAOS ensures seamless user interaction and facilitates simulations.

The versatility of PAOS enables its application to a wide array of optical systems, extending beyond its initial use case. PAOS presents a fast, modern, and reliable POP simulation tool for the scientific community, enhancing the assessment of optical performance in various optical systems and making advanced simulations more accessible and user-friendly.

Benchmark

Statement of need

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References