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Poster
The Quasi-Radial Field-line Tracing (QRaFT) methodology has been developed for testing the magnetic geometry of open-flux solar coronal regions based on optical gradients in white-light coronal images. The current implementation of the QRaFT package is based on an adaptive pipeline of noise suppression, edge enhancement and morphology-constrained filtering algorithms aimed at identifying spatially consistent quasi-radial optical features characterizing open solar corona. The primary science data product of QRaFT is the plane-of-scale orientation angles of the detected azimuthal optical gradients expected to be closely aligned with the underlying coronal magnetic field. A collection of QRaFT features detected from different viewing angles over a course of Carrington rotation enables a direct data-driven reconstruction of the quasi-stationary component of the three-dimensional coronal magnetic field, and to use this information for testing and constraining global coronal and inner heliopsheric models. In this talk, we will present recent results of a quantitative validation of the QRaFT methodology using magnetohydrodynamic simulations, and examples of its application to different types of imaging data, including synthetic coronal images produced by the FORWARD code, as well as polarized intensity images obtained from ground-based and space-borne coronagraphs such as MLSO K-cor and STEREO COR1. We will also discuss possible applications of QRaFT for reconstructing the magnetic geometry of the outermost solar corona and the young solar wind using the capabilities of the upcoming PUNCH mission, and for developing PUNCH-based quantitative metrics for measuring the performance of global heliospheric models such as WSA-ENLIL.
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