Coronal magnetic field modeling using stereoscopy constraints

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Abstract

To obtain the 3D-structure of coronal magnetic loops two complementary methods have been used in the past: 1) Extrapolating the measured photospheric field vector into the corona and 2) Stereoscopy with coronal EUV images from the two STEREO-spacecraft. Some authors tried to combine the two methods. They used the extrapolation of the magnetic field, in most cases with linear force-free models, in order to do a better identification and match of the loop pairs for the
stereoscopic reconstruction.
Within this work we present a novel approach and use stereoscopic reconstructed loops from STEREO/EUVI as a constraint for nonlinear force-free coronal magnetic field extrapolations. For this aim we extended a nonlinear force-free optimization code by an additional functional, which monitors and minimizes the difference of the force-free magnetic field model and the 3D plasma loops.

Keywords: magnetic field modeling, stereoscopy, coronal loops

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