

Talk at Splinter Meeting

Splinter K

CORONAL MAGNETIC FIELD MODELING USING STEREOSCOPY
CONSTRAINTS

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Nonlinear force-free field (NLFFF) extrapolation has been used extensively in the past to extrapolate solar surface magnetograms to stationary coronal field models. In theoretical tests with known boundary conditions, the nonlinear boundary value problem can be solved reliably. However, if the magnetogram is measured with errors, the extrapolation often yields field lines that disagree with the shapes of simultaneously observed and stereoscopically reconstructed coronal loops. We here propose an extension to an (NLFFF) extrapolation scheme that remedies this deficiency in that it incorporates the loop information in the extrapolation procedure.

We extended the variational formulation of the (NLFFF) optimization code by an additional term that monitors and minimizes the difference of the local magnetic field direction and the orientation of 3D plasma loops. We tested the performance of the new code with a previously reported semi-analytical force-free solution.

We demonstrate that there is a range of force-free and divergence-free solutions that comply with the boundary measurements within some error bound. With our new approach we can obtain the solution out of this set the coronal fields which is well aligned with given loops.