

## Two Approaches for the Potential Model of Coronal Magnetic Fields

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The potential model has been widely used to extrapolate the coronal magnetic fields from the observed photospheric magnetic fields.

In this model, we have to solve the Laplace equation of the magnetic scalar potential. Since the potential can be expanded into a spherical harmonic series in spherical polar coordinates, the problem comes to compute the spherical harmonic coefficients of it. These coefficients are determined from the boundary conditions (observed photospheric fields).

Zhao & Hoeksema(1992) and Hakamada(1995) proposed the simple recursion formula to determine the spherical harmonic coefficients when the line-of-sight component of the photospheric field represented by the radial component and the  $\theta$ -component of the potential field (i.e.  $B_l = B_r \sin \theta + B_\theta \cos \theta$ ). Meanwhile, Wang & Sheeley(1992) claimed that a better approach is to match only the radial component of the potential field to the photospheric data (i.e.  $B_l = B_r \sin \theta$ ).

We have computed the spherical harmonic coefficients and the coronal magnetic fields assuming artificial photospheric data in both cases. We show the computational results and discuss some differences between them.