Some initial applications of the new BEM extrapolation code for reconstructing the coronal magnetic field above solar active regions

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Magnetic fields play an important role in many physical events occurring in the solar atmosphere. However, reliable magnetic field measurements in the corona are still facing technical difficulties unconquerable today. For many years, photospherical magnetograms have been combined with various field extrapolation methods to reconstruct the magnetic fields in the corona under the force-free field assumption. In this paper, we present some initial results obtained by our recently rebuilt BEM extrapolation code for reconstructing the coronal magnetic field above the solar active regions. Equipped with 10 iterative solvers of linear systems found in the SPARSKIT package, the new BEM extrapolation code has the merits of efficiency and easy usage. Some 3D visualization codes are also developed, with which the twists and sigmoidal shapes in the reconstructed 3D magnetic fields can be illustrated more properly.