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Detection of Magnetic Nulls in Toroidal Geometry[1] ALLEN R. SANDERSON, XAVIER TRICOCHE, CHRISTOPH GARTH, University of Kaiserslautern, SCOTT KRUGER, Tech-X Corporation, CARL SOVINEC, University of Wisconsin, ERIC HELD, Utah State University, JOSHUA BRESLAU, Princeton Plasma Physics Laboratory, CENTER FOR EXTENDED MHD MODELING TEAM — The importance of magnetic nulls in toroidal geometry has long been recognized in the fusion community as an important component to understand plasma transport. Most methods for numerically calculating the magnetic nulls use as their basis Taylor expansions about the singular points in "flux space." The difficulty of these methods is that they require a mapping from physical space (X,Y,Z) into flux space (flux, theta, phi) and doing this mapping accurately is very difficult. As a consequence, these methods are not robust, especially in the complicated geometries of modern experiments. In this work, we present methods that are purely geometric, local in nature, and geared for parallel computations. Emphasis is on robustness and speed and "sufficiently accurate" methods, which are more suitable for visualization. The application of these methods to data from the NIMROD and M3D codes will be presented.

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