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Linear Analysis of Drift Ballooning Modes in Tokamak Edge Plasmas[1] VARUN TANGRI, ARNOLD KRITZ, TARIQ RAFIQ, Lehigh University, ALEXEI PANKIN, Tech-X Corp. — The H-mode pedestal structure depends on the linear stability of drift ballooning modes (DBMs) in many H-mode pedestal models. Integrated modeling that uses these pedestal models requires fast evaluation of linear stability of DBMs. Linear analysis of DBMs is also needed in the computations of effective diffusivities associated with anomalous transport that is driven by the DBMs in tokamak edge plasmas. In this study several numerical techniques of linear analysis of the DBMs are investigated. Differentiation matrix based spectral methods are used to compute the physical eigenvalues of the DBMs. The model for DBMs used here consists of six differential equations [T. Rafiq *et al.* Phys. Plasmas, **17,** 082511, (2010)]. It is important to differentiate among non-physical (numerical) modes and physical modes. The determination of the number of eigenvalues is solved by a computation of the 'nearest' and 'ordinal' distances. The Finite Difference, Hermite and Sinc based differentiation matrices are used. It is shown that spectral collocation methods are more accurate than finite difference methods. The technique that has been developed for calculating eigenvalues is quite general and is relevant in the computation of other modes that utilize the ballooning mode formalism.

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