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Modelling of turbulence in X-point configurations with BOUT++
BRENDAN SHANAHAN, BEN DUDSON, York Plasma Institute, Department of Physics, University of York, Heslington, York, YO10 5DD, PETER HILL, CEA, IRFM, F-13108 Saint-Paul-lez-Durance, France — Simulations of instabilities and turbulence in X-point configurations are challenging due to the limitations of field-aligned coordinate systems: X-point dynamics are often extrapolated based on nearby flux surfaces, which could exclude relevant physics. The Flux Coordinate Independent (FCI) approach developed by Hariri et al. overcomes these limitations, and has been implemented in the BOUT++ framework. Here it is used to study turbulence in linear devices with X-point magnetic configurations. We compare the performance and accuracy of the FCI approach with other schemes, and present results of 3D drift-wave turbulence and flows in X-point configurations using two cold ion fluid models. Simulations have been performed to explore the feasibility of experimentally studying X-point configurations in linear plasma devices which indicate the effect of an externally applied X-point field. Preliminary studies of blobs and turbulence in toroidal geometries with X-points will be presented and the implications for tokamaks will be discussed.

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