

Abstract Submitted  
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**Mind the Gap: Exploring the Physics of Null Points Using Unconventional Coordinate Systems** BRENDAN SHANAHAN, BEN DUDSON, York Plasma Institute, Department of Physics, University of York. York, YO10 5DD UK, FABIO AVINO, EPFL, CRPP, Association Euratom-Confédération Suisse, CH-1015 Lausanne, Switzerland, JARROD LEDDY, PETER HILL, York Plasma Institute, Department of Physics, University of York. York, YO10 5DD UK, IVO FURNO, EPFL, CRPP, Association Euratom-Confédération Suisse, CH-1015 Lausanne, Switzerland — 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 interpolated from flux surfaces, which could exclude relevant physics. Here we explore the physics of null regions in multiple geometries using unconventional coordinate systems in BOUT++. Specifically, we have investigated the physics of blob propagation and compared with experimental measurements within the TORPEX device, indicating an increase in inertially limited filament propagation in the null region caused by longer connection lengths. The null point dynamics of filaments crossing the separatrix in tokamak geometry will also be presented using a novel field-aligned coordinate system, with applications to ELM and blob theory. Finally, recent work on implementation and applicability of the Flux Coordinate Independent (FCI) approach to complex magnetic geometry modelling will be discussed.

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