Abstract Submitted
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Global simulations of ion temperature gradient driven modes in stellarator geometry with the gyrokinetic code XGC-S MICHAEL COLE, ROBERT HAGER, PPPL, TOSEO MORITAKA, NIFS, SAM LAZERSON, SEUNG-HOE KU, CHOONG-SEOCK CHANG, PPPL — Neoclassical optimisation has enabled stellarators where anomalous transport dominates, as in tokamaks. This is seen in Wendelstein 7-X's OP1.2. Simulations are needed to improve our understanding of turbulent transport in stellarators. Optimisation is also possible with the help of high performance computing. So far core global linear delta-f and nonlinear flux tube ensemble simulations have been performed. XGC is now being extended with a new version, XGC-S, ultimately including the code family's main features: total-f gyrokinetics to the first wall, for stellarators. XGC-S has recently been verified for fast particle orbit tracing, geodesic acoustic modes, and linear delta-f ion temperature gradient-driven (ITG) modes. Here, we will show the results of verification studies for linear and nonlinear delta-f ITG modes, which are believed to cause anomalous transport. They demonstrate that the tool can be used with confidence to simulate such physics globally in general stellarator geometry. Linear and nonlinear simulations of ITG modes in NCSX and W7-X geometries will be presented. Comparison between the global behaviour of the two stellarator types can be made. Ongoing implementation of new techniques for EM gyrokinetic simulation, also for stellarators, will be described.

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