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Extension of the XGC code for global gyrokinetic simulations in stellarator geometry MICHAEL COLE, Princeton Plasma Physics Laboratory, TOSEO MORITAKA, National Institute for Fusion Science, ROSCOE WHITE, ROBERT HAGER, SEUNG-HOE KU, CHOONG-SEOCK CHANG, Princeton Plasma Physics Laboratory — In this work, the total-f, gyrokinetic particle-in-cell code XGC is extended to treat stellarator geometries. Improvements to meshing tools and the code itself have enabled the first physics studies, including single particle tracing and flux surface mapping in the magnetic geometry of the heliotron LHD and quasi-isodynamic stellarator Wendelstein 7-X. These have provided the first successful test cases for our approach. XGC is uniquely placed to model the complex edge physics of stellarators. A roadmap to such a global confinement modeling capability will be presented. Single particle studies will include the physics of energetic particles global stochastic motions and their effect on confinement. Good confinement of energetic particles is vital for a successful stellarator reactor design. These results can be compared in the core region with those of other codes, such as ORBIT3d. In subsequent work, neoclassical transport and turbulence can then be considered and compared to results from codes such as EUTERPE and GENE. After sufficient verification in the core region, XGC will move into the stellarator edge region including the material wall and neutral particle recycling.

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