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Coupling core delta-f and edge total-f gyrokinetic codes with kinetic electron dynamics[1] J. DOMINSKI, Princeton Plasma Physics Laboratory, Princeton, 08540 New Jersey, USA, V. CAREY, Department of Mathematics and Statistics, University of Colorado-Denver, C.S. CHANG, R. HAGER, S. KU, Princeton Plasma Physics Laboratory, Princeton, 08540 New Jersey, USA — The Exascale High-fidelity Whole Device Modeling project is about coupling an edge total-f gyrokinetic simulation to a core delta-f simulation so that a high fidelity gyrokinetic solution can be economically obtained in the whole ITER volume with the prediction for pedestal height and width. A strongly coupled simulation across a surface interface is a difficult problem. We have succeeded in the gyrokinetic ion coupling with adiabatic electrons [Dominski et al., Phys. Plasmas 25, 072308 (2018)] exchanging only the 3D charge-density. To enable the kinetic electron coupling, we upgrade this coupling scheme in which the particle distribution function information is exchanged between core and edge simulations on a 5D grid. Using an intermediate grid enables to couple different numerical schemes, i.e., coupling Eulerian with PIC or delta-f with total-f. The scheme is first developed between two XGC code versions: core delta-f and edge total-f versions. The transfer of information between marker particles and the grid employs a re-sampling technique [D. Faghihi et al, submitted to JCP]. The successfully coupled codes in the ECP-WDM framework will provide a base for further code coupling to incorporate other important physics, such as rf-heating, MHD, NBI, energetic particles, PMI.

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