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Coupled Kinetic-MHD Simulations of Divertor Heat Load with ELM Perturbations JULIAN CUMMINGS, California Institute of Technology, C.S. CHANG, GUNYOUNG PARK, New York University, LINDA SUGIYAMA, Massachusetts Institute of Technology, ALEXEI PANKIN, Lehigh University, SCOTT KLASKY, NORBERT PODHORSZKI, Oak Ridge National Laboratory, CIPRIAN DOCAN, MANISH PARASHAR, Rutgers University, CPES TEAM —
The effect of Type-I ELM activity on divertor plate heat load is a key component of the DOE OFES Joint Research Target milestones for this year. In this talk, we present simulations of kinetic edge physics, ELM activity, and the associated divertor heat loads in which we couple the discrete guiding-center neoclassical transport code XGC0 with the nonlinear extended MHD code M3D using the End-to-end Framework for Fusion Integrated Simulations, or EFFIS. In these coupled simulations, the kinetic code and the MHD code run concurrently on the same massively parallel platform and periodic data exchanges are performed using a memory-to-memory coupling technology provided by EFFIS. The M3D code models the fast ELM event and sends frequent updates of the magnetic field perturbations and electrostatic potential to XGC0, which in turn tracks particle dynamics under the influence of these perturbations and collects divertor particle and energy flux statistics. We describe here how EFFIS technologies facilitate these coupled simulations and discuss results for DIII-D, NSTX and Alcator C-Mod tokamak discharges.

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