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Integrated, multiphysics, high-performance computations on EFFIS framework in CPES[1] C.S. CHANG, Courant Institute, NYU, AND THE CPES TEAM — Overview of important multiscale physics results, enabled by the high-performance integrated simulation tool set EFFIS (End- to-end Framework for Fusion Integrated Simulation), will be presented. Three multiscale physics integration examples to be summarized are a) kinetic pedestal growth, magnetic equilibrium reconstruction, linear stability check, ELM crash, and divertor heat-load profile detection; b)kinetic transport modeling and electromagnetic micro-turbulences; and c) RMP penetration and kinetic pedestal transport. EFFIS performs the real-time integrated simulation with minimal intrusion into the component codes, and allows for independent choices of compilers by the component codes. The component codes can be of any kind, ranging from small scale memory intensive codes to extreme scale parallel processing codes. It can even be a binary executable. Memory-to-memory and file-to-file coupling can be mixed together within one real- time integrated simulation. The results are monitored in a web- based dashboard for collaborative physics analysis and validation, with all the provenance information automatically captured.

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