FACETS for Multiphysics, Whole-Fusion-Device Modeling J.R. CARY, Tech-X and U. Colorado, THE FACETS TEAM — FACETS is developing a multi-physics, multi-region computational application for whole-fusion-device modeling. The FACETS framework supports (1) concurrently executing components, (2) usability on platforms from laptops to Leadership Class Facilities (LCFs), (3) ability to reuse legacy code, (4) ability to include or exclude modules at link time, and (5) ability to instantiate particular implementations (e.g., for different transport fluxes) at runtime. FACETS has developed a parallel core solver (using nested iteration for improved convergence) that speeds up core transport calculations by 1.5 orders of magnitude. FACETS has multiple models for transport fluxes, which it obtains through the FMCFM generic interfaces. FACETS is currently using UEDGE for edge transport, with transport coefficients taken from experiment, and it is using NUBEAM for neutral beam injection. On the horizon are the inclusion of RF sources, free-boundary equilibrium, and wall modeling. FACETS has been benchmarked against ASTRA for core transport, and has now provided first results for core-edge simulations. The latter show early time experimental edge diffusivities can be used to predict self-consistent pedestal buildup.

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