

Abstract Submitted  
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**Implicit core-edge coupling in FACETS** JOHAN CARLSSON, JOHN CARY, Tech-X Corporation — In integrated simulations, implicit coupling can be used to put component codes in a self-consistent state at the end of every time step. With explicit coupling, self-consistency is only achieved in the limit of infinitely short time step, or at steady state. From the perspective of an implicit coupler, each component code is simply a vector-valued function (typically nonlinear) of a vector argument, where the components of the argument vector are the code input variables and the value vector consists of the output variables. Implicit coupling then becomes the solve of a nonlinear system of equations. A good nonlinear solver should minimize the number of function evaluations, each corresponding to a code run and therefore very numerically expensive. We have implemented implicit component coupling in FACETS using either Picard iteration or a quasi-Newton scheme with the Jacobian computed using the hypersecant approximation, which requires no extra function evaluations. Results are presented for implicit coupling of core and edge transport components.

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