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Process Model of A Fusion Fuel Recovery System for a Direct Drive IFE Power Reactor SASWATHI NATTA, MARIA ARISTOVA, CHARLES GENTILE, PPPL, PPPL COLLABORATION, LANL COLLABORATION, SRNL COLLABORATION, NRL COLLABORATION — A task has been initiated to develop a detailed representative model for the fuel recovery system (FRS) in the prospective direct drive inertial fusion energy (IFE) reactor. As part of the conceptual design phase of the project, a chemical process model is developed in order to observe the interaction of system components. This process model is developed using FEMLAB Multiphysics software with the corresponding chemical engineering module (CEM). Initially, the reactants, system structure, and processes are defined using known chemical species of the target chamber exhaust. Each step within the Fuel recovery system is modeled compartmentally and then merged to form the closed loop fuel recovery system. The output, which includes physical properties and chemical content of the products, is analyzed after each step of the system to determine the most efficient and productive system parameters. This will serve to attenuate possible bottlenecks in the system. This modeling evaluation is instrumental in optimizing and closing the fusion fuel cycle in a direct drive IFE power reactor. The results of the modeling are presented in this paper.

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