

Abstract Submitted
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Simulation and Analysis of Isotope Separation System for Fusion Fuel Recovery System BATHIYA SENEVIRATHNA, CHARLES GENTILE, PPPL — This paper presents results of a simulation of the Fuel Recovery System (FRS) for the Laser Inertial Fusion Engine (LIFE) reactor. The LIFE reaction will produce exhaust gases that will need to be recycled in the FRS along with xenon, the chamber's intervention gas. Solids and liquids will first be removed and then vapor traps are used to remove large gas molecules such as lead. The gas will be reacted with lithium at high temperatures to extract the hydrogen isotopes, protium, deuterium, and tritium in hydride form. The hydrogen isotopes will be recovered using a lithium blanket processing system already in place and this product will be sent to the Isotope Separation System (ISS). The ISS will be modeled in software to analyze its effectiveness. Aspen HYSYS was chosen for this purpose for its widespread use industrial gas processing systems. Reactants and corresponding chemical reactions had to be initialized in the software. The ISS primarily consists of four cryogenic distillation columns and these were modeled in HYSYS based on design requirements. Fractional compositions of the distillate and liquid products were analyzed and used to optimize the overall system.

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