MODIFYING MAGLIF STAGNATION CONDITIONS AND MORPHOLOGY BY CHANGING LINER INITIAL CONDITIONS*


Sandia National Laboratories
Albuquerque, NM 87123 USA

Magnetized Liner Inertial Fusion (MagLIF) has provided many promising results including initial DD neutron yields of >10^{12} [1] and high magnetization in the stagnated column (BR>10^{5} G cm) [2]. An interesting result from initial experiments was the presence of a quasi-helical structure to the stagnation column, which is postulated to be the result of feedthrough from a helical structure observed on the outside of pre-magnetized liners [3]. We present the first data exploring the connection of the stagnation morphology to these early-time structures by varying the initial liner conditions in two ways. We studied feedthrough of the instabilities by varying the liner aspect ratio (radius/thickness) and demonstrated that lower aspect ratio liners (i.e. thicker liners) exhibited less feedthrough of the instabilities, and that the opposite was true for higher aspect ratio liners. We then explored the role of the seed for these instabilities by adding a coating to the outer surface of these high aspect ratio liners, a technique which has previously been shown to minimize Electro-Thermal Instabilities which seed other instabilities. Data showed that, using these coatings, we could produce a cylindrical stagnation column with promising neutron yields. We will discuss the differences in stagnation in the different cases, including inferred differences in the liner density, the stagnation morphology, magnetization and the plasma conditions.


* Sandia National Laboratories is a multiprogram laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy’s National Nuclear Security Administration under Contract No. DE-AC04-94AL85000