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Effects due to beryllium microstructure in cryogenic NIF ignition capsules* M.M. MARINAK, N.R. BARTON, R. BECKER, J.D. SALMONSON, S.W. HAAN, Lawrence Livermore National Laboratory — The polycrystalline structure of a beryllium ablator can produce asymmetries that seed hydrodynamic instabilities. Our NIF ignition capsules are designed to minimize beryllium grain effects by promptly melting the ablator before or during the passage of the first shock. The release of residual stresses during shock melting still induces small perturbations (δv/v $\sim$ $10^{\neg 4}$) in the flow field. We simulate their effect on a capsule having a beryllium ablator uniformly doped with copper. A 3D polycrystalline model is employed in ALE3D, a multiphysics arbitrary Lagrange Eulerian code, to calculate the response to the first shock. It resolves the anisotropic elastic and plastic response, down to individual grains. Perturbations are then linked to a HYDRA simulation of the full implosion. Simulations resolving modes $\ell \sim$ 11- 600 show minor perturbation growth in a fully melted ablator. We also consider a recent capsule design with graded dopant concentrations in a silicon-lined hohlraum. High levels of x-ray preheat from the silicon cause the beryllium grains to expand into the ice. Effects of the perturbations induced at the ice-ablator interface are simulated.

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