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Modeling Decomposed Foam Dynamics using a Level Set – Extended Finite Element Approach DAVID NOBLE, AMY SUN, Sandia National Laboratories — When exposed to high temperatures, removable epoxy foam (REF) undergoes liquefaction and surface evaporation. Simulations of these dynamics require that the interfacial conditions be modeled accurately including the surface reaction and surface tension. The large deformation of the liquid-vapor interface makes Eulerian simulation methods highly desirable. Extended finite element methods (XFEM) are well suited for simulating surface-dominated physics using Eulerian finite elements. An XFEM model for modeling REF is developed. The liquid-vapor interface is described using a level set method. The energy, momentum, and continuity equations are solve throughout the foam and vapor phases. To capture the discontinuous pressure caused by surface tension, the pressure field is enriched with a heaviside function. The species equations are solved only within the elements that contain foam. The mass flux due to the surface reaction is weakly applied along the embedded interface. XFEM is shown to capture the complex interfacial physics while allowing the interface to move freely through the mesh.

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