A SEMI-LAGRANGIAN APPROACH TO MOVING INTERFACES

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We present a modular semi-Lagrangian strategy for evolving material interfaces in problems including etching, wearing, Ostwald ripening, and faceted crystal growth. General moving interfaces subject to arbitrary velocity functionals are implicitly updated via an explicit second-order semi-Lagrangian advection formula. The interface is extracted with adaptive contouring based on e_cient geometric algorithms and high-order deferred correction solvers for two-point boundary value problems. Spatial and temporal resolutions are decoupled, permitting grid-free adaptive refinement of the interface geometry. A modular black-box implementation couples to arbitrary evaluation modules for nonlocal velocities.