Abstract Submitted
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Direct numerical simulation of surface ablation by turbulent convection[1] RYAN CROCKER, YVES DUBIEF, University of Vermont, CHRISTOPHER WHITE, University of New Hampshire — Rapid erosion by a turbulent flow creates complex flow/surface phenomena arising from the evolving surface topography and its interaction with a turbulent flow that transports the erosive agent onto the surface. The non-equilibrium nature of the problem poses major challenges to current turbulent models and boundary conditions used in direct numerical simulation (DNS) algorithms. A generalized algorithm for turbulent erosion processes based on level-set and immersed boundary methods has been developed in a DNS flow solver to investigate the action of various erosive agents (heat, particles, chemical species) on erodible surfaces. This algorithm is applied to the ablation of a slab of ice by natural and forced convection of water. The study focuses on the characterization of the surface topography in relation to the evolution of coherent structures in the flow, as ablation proceeds.

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