Abstract Submitted
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The Interaction Between Non-Equilibrium Turbulence and a Thermally Ablative Surface[1] RYAN CROCKER, YVES DUBIEF, University of Vermont — This main interest of this work concerns the interplay between an erosive flow and erodible surface when the erosive process is low enthalpy ablation. Such systems are know to create coherent ablation patters and cascading mass loss rates due the dynamic interactions between the changing topography of the surface and the near wall physics of turbulent flow. These interactions demonstrate a strong coupling between the mass, momentum, and heat transfers in both time and space. In an attempt to elucidate these couplings and their interconnection a direct numerical algorithm has been developed to simulate ablative turbulent flows. The large jump in physical parameters across the interface is handled with the ghost fluid technique and the surface is tracked with level set methods advected and reinitialized with a fully conservative fast marching method. A mass conserving, cut cell, immersed boundary method is employed to simulate the interaction between the momentum equations and the ablating boundary on a non-conforming mesh. Known solutions to conjugate heat transfer, melting and solidification (both Stefan and Neumann) are used to validate the procedure.

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