Abstract Submitted
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Continuum-microscopic computation of complex fluid flow SORIN MITRAN, Applied Mathematics - UNC — A method to compute the continuum flows of a fluid defined through its micrscopic behavior is presented. Adaptive mesh refinement is employed on the continuum level to dynamically locate areas where the continuum constitutive laws no longer hold. Areas so identified are sampled at a microscopic level in accordance with some microscopic model (e.g. Kelvin, Zener, Burgers for viscoelastic flows) which features spatially varying properties. A hierarchical microscopic simulation is carried out in order to computationally identify statistical moments entering into the continuum level consitutive law. Dynamics from a finer level of microscopic simulation are analyzed through principal orthogonal decomposition and higher-order tensor decompositions in order to identify modes that are representable on a coarser level. Thermal background is captured through a multi-level heat equation. Applications especially related to bio-fluids problems are presented.

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