

Abstract Submitted
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Framework for filtering/averaging Boltzmann equation for turbulence description SHARATH GIRIMAJI, Texas A&M University — Boltzmann equation enjoys a wider range of applicability than Navier-Stokes equation for describing flow transport phenomena. However, averaging or filtering the Boltzmann equation for turbulence description and closure model development has proven to be quite challenging. To reconcile the physics of filtered Boltzmann equation with that of filtered Navier-Stokes, we demonstrate that a crucial transformation of variables must be effected. The physical effects of the fluctuating velocity field on the evolution of the one-point velocity distribution function is clearly elucidated. This will pave the way for unifying the turbulence description of Navier-Stokes and Boltzmann equations and developing flow solvers valid over a wide range of Knudsen numbers.

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