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Stresses in Binary Particulate Systems JIN LIU, Department of Mechanical Engineering, the Johns Hopkins University, Baltimore, MD 21218 and Theoretical Division, T3, LANL, Los Alamos, NM 87545, SHIYI CHEN, Department of Mechanical Engineering, the Johns Hopkins University, Baltimore, MD 21218 and CoE and CCSE, Peking University, Beijing, China, DUANZHONG ZHANG, Theoretical Division, Fluid Dynamics Group T3, Los Alamos National Laboratory, Los Alamos, NM 87544 — A unified framework of equations for binary particulate systems are first derived based on two-equation model, these equations are correct from molecular systems to disperse two-phase flows. It is shown that the interactions between different species not only result in an exchange force but also an interspecies stress, which is crucial for recovering the averaged equations in the limit of disperse two-phase flow. The behaviors of exchange force, intraspecies stresses and interspecies stresses are explored using direct numerical simulations of binary particulate system in a periodic box undergoing relative motion, based on which the possible closure for derived equations is also discussed.

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