Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

In search of a Corresponding state description of the thermodynamics and dynamics of complex fluids. TAMOGHNA DAS, National Institute of Standards and Technology University of Maryland, MAHESH BANDI, Okinawa Institute of Science and Technology Graduate University, JACK DOUGLAS, National Institute of Standards and Technology — Long ago, Pitzar introduced a scheme for characterizing the relative "complexity" of fluids based on a consideration of the temperature dependence of the second virial coefficient at low temperature, where this property is sensitive to the form of the inter-molecular potential. "Simple" fluids, in this classification scheme, are those that satisfy a common "corresponding states" in which the properties (eg. shape of the phase boundary, surface tension etc.) obey a universal reduced variable scaling description. This idea was pioneered by van der Waals based on his equation of states describing the pressure of gases. Many real fluids are not "simple" in the sense that the molecules have complex shapes and interact with a combination of short-range and long-range directional interactions having different spatial interaction ranges. These features lead to these fluids being classified as "complex". We show that an effective reduced variable description for a model complex fluid can be achieved by defining a reduced variable involving the second virial coefficient. We further show that a recent reduced variable description of the dynamics and thermodynamics of glass-forming liquids derives from the same principle.

Tamoghna Das
National Institute of Standards and Technology
University of Maryland

Date submitted: 06 Nov 2015 Electronic form version 1.4