

Graduate Student Research Seminar

Fall 2022

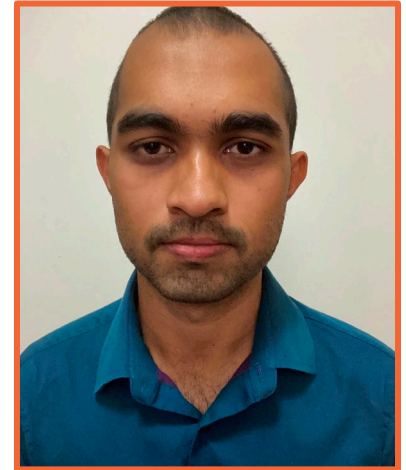
A Brief History of Fluid Relaxation Time

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Advisor: Dr. Xiangchun Xuan

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3:00 pm (EST) – 132 Fluor Daniel Building



Abstract

Water is a special fluid, it has no memory. It adapts immediately to the surroundings commensurately to the applied stress. The linear nature of such fluids render their behaviors to be captured by the classical fluid model. On the other hand, fluids in cosmetics, petroleum, foods and beverages, lava, manufacturing, biology, and whatnot in this modern world today, commonly contain solutes in scales above the solvent size. This results in drastic differences in the fluid properties, invoking an entire branch of fluid mechanics called rheology in the past century. These fluids can carry their stress memory from one location to another in the flow domain. Thus, fluid stress relaxation time becomes a very important parameter for accurate predictions. In this talk, the currently existing methods such as SAOS, CaBER, OSCER, and μ -rheometry, that tackles the issue of extracting fluid relaxation times from different fronts shall be reviewed. Non-dimensional numbers characterizing these flows, namely the Weissenberg and the Deborah number, their origins and contexts, shall be discussed. And lastly, the significance of the time scale of observation shall be explored since even the mountains may flow if observed for long enough.



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