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The Amherst Rheology Platform

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New methods must be developed in order to access rheology's full potential. We envision tools that allow a researcher (or student) to move freely and rapidly between the most advanced rheologicl theories, or between experimental data and theory. This combination would enable him/her to reach a deeper understanding of rheology. The Amherst Rheology Platform (ARP) intends to facilitate this valuable process. We have already completed the experimental part of ARP, implementing the most powerful tools of data analysis. In addition, rheology experts have begun to write theory modules that seamlessly connect into ARP; several modules are complete and more are in progress. Access to rheological information is prompt and no compromises are made in terms of quality. In using ARP's integration approach, rheologists can flexibly plot experimental data in many different ways and combine their data with predictions derived from the foremost theories; complex questions can be formulated and answered without delay. The universal data standard of ARP facilitates communication between laboratories worldwide (and even between various rheometers that are housed in the same laboratory). ARP also creates plots that have affinity to polymer processing applications. One example is the calculation of growing stress in uniaxial extension (start-up from rest, stretching at constant rate), which resembles fiber spinning. Another example is the stress in equibiaxial extension, which resembles film blowing. Theory modules for ARP were written by M. Wagner and coworkers (molecular stress function theory) and by R. Blackwell (tube dilation theory of McLeish and coworkers). The Amherst Rheology Platform has been put to use worldwide in over 40 laboratories. ARP helps with tasks such as the teaching of rheology, rheology research (experimental and theoretical), data communication and archiving, materials development, and process optimization. For further information see http://www.ecs.umass.edu/che/faculty/winter.html.