

ADVANCES IN INTERFACIAL RHEOMETRY: FROM PLATEAU OVER GIBBS TO TODAY

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Interfaces between two fluids are ubiquitous in nature and industrial processes. In many cases, particles, proteins, polymers or Amphiphilic molecules will accumulate at interfaces and fundamentally change the properties. The interface may then become - in itself - a complex fluid with a pronounced rheological response. Joseph Plateau was the first to suggest the existence of a surface viscosity as early as 1860. However, the measurement techniques remain non-trivial. The interfacial rheological functions appear as boundary conditions in a - sometimes-complicated - fluid mechanics problem. There seem to be some misconceptions in literature about what are true material functions and what other contributions may occur, although the work of Gibbs laid down the foundations very clearly.

Recently, the sensitivity of methods for shear rheometry has been improved by combining detailed calculations of the fluid mechanical problem with a careful selection of the measurement probe. Two recent examples include the magnetic rod rheometer and the double wall ring device [1,2]. Dilatational properties remain challenging and we will discuss the different approaches and comment on the relative importance of shear and dilation in mixed flow fields

Some case studies on how to tailor the interfacial rheological properties using colloidal particles will be addressed [3,4], were especially methods that exploit particle shape merit some special attention. Finally, some unexpected applications of interfacial rheology will be briefly discussed [5,6].

Refs

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