Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Role of Laplace pressure in the equilibrium of a pendent drop highlighted by a particle loading L. LECACHEUX, A. SADOUDI, D. CASSAN, A. DURI, UMR IATE 1208 CIRAD/INRA/SupAgro/Universite Montpellier,2 Place Viala,34060 Montpellier,France, T. RUIZ, UMR QualiSud 95 CIRAD/Universite Montpellier,15 av Charles Flahault,34093,Montpellier — A pendent drop at the end of a capillary needle remains in near equilibrium just before breaking: the action of the capillary force must oppose the weight of the drop, to which should be added the force due to Laplace pressure (LP). Thus, for a given fluid and a fixed wet perimeter, its maximum mass should be constant. We modulated the LP by modifying the main curvatures of the drop and we observed the impact on its mass. Drops were loaded with glass beads of increasing mass and induce a stretching of the drops that modulates their main curvatures. Volumes and curvature radii are measured by image analysis. These loading experiments highlight the increase of LP with the loading and the non-linear decrease of the drop mass. However, we observe that the liquid mass in the loaded drop decreases linearly with the increase of the bead mass without verifying the mass balance. Such a result is included in a master curve which highlights the role of the LP in the equilibrium of a pendent drop just before its rupture. It challenges the validity of the well-known Tate's law and allows the setting of functional ranges for capillary micromanipulators.

Laure Lecacheux
UMR IATE 1208 CIRAD/INRA,2 Place Viala,34060 Montpellier,France

Date submitted: 27 Jul 2019 Electronic form version 1.4