

surface shear viscosity

For steady state deformations a surface shear viscosity η^s , and an area viscosity or surface dilatational viscosity ζ^s can be defined. In a Cartesian system with the x -axis normal to the surface, they are defined by the equations:

$$\eta^s = \frac{\sigma_{xy}}{\partial v_y / \partial v_x}$$

and

$$\zeta^s = \Delta\gamma / \frac{d(\ln A)}{dt}$$

where σ_{xy} is the shear component of the surface stress tensor, v_x and v_y are the x and y components of the surface velocity vector, respectively, A is the surface area, t is the time, and $\Delta\gamma$ is the difference between the (steady state) dynamic surface tension and the equilibrium surface tension.

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