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# Capillary Wave Motion and Atomization Induced by Surface Acoustic Waves under the Navier-Slip Condition at the Wall

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**Abstract :** The influence of slippage phenomenon over the destabilization and atomization mechanisms induced via surface acoustic waves on a Newtonian, millimeter-sized, drop deposited on a hydrophilic substrate is studied theoretically. By implementing the Navier-slip model and a lubrication-type approach into the equations which govern the dynamic response of a drop exposed to acoustic stress, a highly nonlinear evolution equation for the air-liquid interface is derived in terms of the acoustic capillary number and the slip coefficient. By numerically solving such an evolution equation, the Spatio-temporal deformation of the drop's free surface is obtained; in this context, atomization of the initial drop into micron-sized droplets is predicted at our numerical model once the acoustically-driven capillary waves reach a critical value: the instability length. Our results show slippage phenomenon at systems with partial and complete wetting favors the formation of capillary waves at the free surface, which traduces in a major volume of liquid being atomized in comparison to the no-slip case for a given time interval. In consequence, slippage at the wall possesses the capability to affect and improve the atomization rate for a drop exposed to a high-frequency acoustic field.

**Keywords :** capillary instability, lubrication theory, navier-slip condition, SAW atomization
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