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Dynamics control of micro-sized droplets for fluid-based electrothermal management[1] DUSTIN BAKER, TAKUMI HAWA, HAIDER HEKIRI, School of Aerospace and Mechanical Engineering, The University of Oklahoma — Heat transfer rate across a micro-scale liquid droplet constrained in two parallel plates at various contact angles are investigated numerically. Electrowetting is used to change how fluids wet solid surfaces, and two plates are at different temperatures. Computational fluid dynamics (FLUENT) is utilized to understand the heat transfer mechanism between two plates and to evaluate the combinations of design parameters needed to produce effective electrowetting thermal management systems. When the high-thermal conductivity fluid does not wet the plates, it functions as a high thermal resistance layer, allowing limited contact surface area for heat transfer through the high-thermal conductivity fluid between the plates. However, when wettability is altered so the high-thermal conductivity fluid wets the plates, the contact area is increased substantially, leading to heat transfer action between the plates. Understanding the dynamics of fluid rearrangement as long as the heat transfer phenomena associated with the fluid rearrangement is particularly important for this system.

[1]BP

Haider Hekiri
School of Aerospace and Mechanical Engineering,
The University of Oklahoma

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