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Jet impingement and thin film breakup on a superhydrophobic surface JULIE CROCKETT, JOSEPH PRINCE, DANIEL MAYNES, Brigham Young University — A vertical laminar jet impinging on a horizontal surface spreads out in a thin film on the surface. If the surface is hydrophobic, and a downstream depth is not maintained the film will breakup into droplets. This occurs where the jet's outward radial momentum is balanced by the inward surface tension force of the advancing film. An analytical model has been created to estimate this location. All surfaces explored are hydrophobic or superhydrophobic (SH), where the SH surfaces exhibit an apparent slip at the surface. For SH surfaces with random micropatterning, the slip on the surface is uniform in all directions and droplet breakup occurs in a circular pattern. When alternating rib/cavity microstructures are used to create a SH surface the slip varies as a function azimuth resulting in an elliptically shaped breakup. The location of breakup for multiple surfaces over a range of jet Weber numbers and realistic slip length values is determined. Results show the breakup radius increases with increasing Weber number and slip length. The eccentricity of the breakup ellipse for the rib/cavity SH structures increases with increasing Weber number and slip length as well. The model results compare well to experimental measurements.

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