Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Particle-Laden Liquid Jet Impingement on a Moving Substrate
HATEF RAHMANI, SHELDON GREEN, Department of Mechanical Engineering, University of British Columbia — The impingement of high-speed jets on a moving substrate is salient to a number of industrial processes such as surface coating in the railroad industry. The particular jet fluids studied were dilute suspensions of neutrally buoyant particles in water-glycerin solutions. At these low particle concentrations, the suspensions have Newtonian fluid viscosity. A variety of jet and surface velocities, solution properties, nozzle diameters, mean particle sizes, and volume fractions were studied. It was observed that for jets with very small particles, addition of solids to the jet enhances deposition and postpones splash relative to a particle-free water-glycerin solution with the same viscosity. In contrast, jets with larger particles in suspension were more prone to splash than single phase jets of the same viscosity. It is speculated that the particle diameter, relative to the lamella thickness, is the key parameter to determine whether splash is suppressed or enhanced. An existing splash model for single phase liquid jets was found to be in good agreement with the experimental results, provided that the single fitting parameter in that model is a function of the particle size, volume fraction, and surface roughness.

Hatef Rahmani
Department of Mechanical Engineering, University of British Columbia

Date submitted: 30 Jul 2017 Electronic form version 1.4