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Water drop impact onto oil covered solid surfaces[1] NINGLI CHEN, Nanjing University of Aeronautics and Astronautics, HUANCHEN CHEN, ALIDAD AMIRFAZLI, York University — Droplet impact onto an oily surface can be encountered routinely in industrial applications; e.g., in spray cooling. It is not clear from literature what impact an oil film may have on the impact process. In this work, water drop impact onto both hydrophobic (glass) and hydrophilic (OTS) substrates which were covered by oil films (silicone) of different thickness (5um-50um) and viscosity (5cst-100cst) were performed. The effects of drop impact velocity, film thickness, and viscosity of the oil film and wettability of the substrate were studied. Our results show that when the film viscosity and impact velocity is low, the water drop deformed into the usual disk shape after impact, and rebounded from the surface. Such rebound phenomena disappears, when the viscosity of oil becomes very large. With the increase of the impact velocity, crown and splashing appears in the spreading phase. The crown and splashing behavior appears more easily with the increase of film thickness and decrease of its viscosity. It was also found that the substrate wettability can only affect the impact process in cases which drop has a large Webber number (We = 594), and the film's viscosity and thickness are small.

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