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Abstract
The impact of a diesel-water compound drop on a dry quartz surface was studied. The impact outcome depends on a core-to-shell mass ratio and a modified Weber number, which takes into account the surface energy and kinetic energy of both the shell and the core liquid. For a modified Weber number less than 570 and a core-to-shell mass ratio located between 0.05 and 0.5, five collision outcomes were observed: complete deposition, shell deposition with core partial rebound, shell splash with core-shell deposition, shell splash with core partial rebound, and shell splash with core-shell partial rebound. As the core-to-shell mass ratio increased, both shell and core partial rebound happened at a lower Weber number. The time taken to the maximum-spread diameter is almost the same to shell and core in the condition of non-splash and the influences of the modified Weber number and the core-to-shell mass ratio are insignificant. The maximum-spread diameter of the shell drop is dominated by the modified Weber number, not by the core-to-shell mass ratio. On the other hand, the maximum-spread diameter of the core drop increases with the increasing of the modified Weber number and the core-to-shell mass ratio.
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