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Boundary-layer effects in droplet splashing GUILLAUME RIBOUX, JOSE MANUEL GORDILLO, Universidad de Sevilla — A drop falling onto a solid substrate will disintegrate into smaller parts when its impact velocity exceeds the so called critical velocity for splashing. Under these circumstances, the very thin liquid sheet ejected tangentially to the solid after the drop touches the substrate, lifts off as a consequence of the aerodynamic forces exerted on it and finally breaks into smaller droplets, violently ejected radially outwards, provoking the splash. Here, the tangential deceleration experienced by the fluid entering the thin liquid sheet is investigated making use of boundary layer theory. The velocity component tangent to the solid, computed using potential flow theory provides the far field boundary condition as well as the pressure gradient for the boundary layer equations. The structure of the flow permits to find a self similar solution of the boundary layer equations. This solution is then used to calculate the boundary layer thickness at the root of the lamella as well as the shear stress at the wall. The splash model presented in Riboux & Gordillo, PRL, 2014, which is slightly modified to account for the results obtained from the boundary layer analysis, provides a very good agreement between the measurements and the predicted values of the critical velocity for the splash.

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