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Why does a beer bottle foam up after a sudden impact on its mouth? JAVIER RODRIGUEZ-RODRIGUEZ, ALMUDENA CASADO-CHACON, Carlos III University of Madrid, Spain, DANIEL FUSTER, CNRS (UMR 7190), Universite Pierre et Marie Curie, Institut Jean le Rond d'Alembert, France — A sudden vertical impact on the mouth of a beer bottle generates a compression wave that propagates through the glass towards the bottom. When this wave reaches the base of the bottle, it is transmitted to the liquid as an expansion wave that travels to free surface, where it bounces back as a compression wave. This train of expansion-compression waves drives the forced cavitation of existing air pockets, leading to their violent collapse. A cloud of very small daughter bubbles are generated upon these collapses, that expand much faster than their mothers due to their smaller size. These rapidly growing bubble clusters effectively act as buoyancy sources, what leads to the formation of bubble-laden plumes whose void fraction increases quickly by several orders of magnitude, eventually turning most of the beverage into foam. In this talk, we will analyze quantitatively these processes in order to explain the extremely high efficiency of the degasification process that occurs in the bottle within the few seconds that follow the impact. This work has been supported by Spanish Ministries of Science and of Economy and Competitiveness through grants: DPI2008-06369 and DPI2011-28356-C03-02.

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