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Predictions and Measurements of Blood Backspatter from a Gunshot in Bloodstain Pattern Analysis[1] PATRICK COMISKEY, ALEXANDER YARIN, Univ of Illinois - Chicago, SUNGU KIM, DANIEL ATTINGER, Iowa State University — A theoretical model for predicting and interpreting blood spatter patterns resulting from a gunshot wound is proposed. The physical process generating a backward spatter of blood is linked to the Rayleigh-Taylor instability of blood accelerated toward the surrounding air allowing the determination of initial distribution of drop sizes and velocities. Then, the motion of many drops in air is considered with governing equations accounting for gravity and air drag. The model predicts the atomization process, the trajectories of the back spatter drops of blood from the wound to the ground, the impact angle and the impact Weber number on the ground, as well as the number of, distribution, and location of blood stains and their shapes and sizes. The drop cloud originating from a wound entrains a significant mass of air due to the action of viscous forces. As a result of this collective effect, air drag acting on individual drops in the cloud is significantly reduced and fully accounted for in the model. The results of the model are compared to experimental data on back spatter generated by a gunshot impacting a blood-impregnated sponge. The model proposed in this work is in reasonable agreement with the results from the experimental data.

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