

Abstract Submitted  
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**Engineering formulas for penetration of sand by high speed projectiles** STEPHAN BLESS, New York University Tandon School of Engineering, Brooklyn, NY, MEHDI OMIDVAR, Manhattan College, New York City, MAGUED ISKANDER, New York University Tandon School of Engineering, Brooklyn, NY — Penetration of sand can be described by a Poncelet equation. However, it is necessary to use two values for the Poncelet drag, depending on whether the penetration velocity is above or below the value at which significant grain crushing occurs. Published data for laboratory-scale time-resolved penetration of sand are reviewed and in some cases reanalyzed in order to determine values of Poncelet coefficients for silica sand. A variation with relative density (e.g. porosity) is needed for the drag parameter. A depth dependence for the Poncelet strength is also proposed. The calibrated Poncelet equation can be used to make prediction for penetration into silica sand by rigid projectiles for the velocity range of tens to hundreds of meters per second.

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