Penetration drag in loosely packed granular materials STEPHAN
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Civil & Urban Eng'ng, NEW YORK UNIVERSITY COLLABORATION — The
drag coefficient for penetration of granular materials by conical-nosed penetrators
was computed by assuming the particles are non-interacting and rebound elastically
off of the advancing penetrator. The solution was C =4 [sin(theta)]**2, where theta
is the half angle of the cone. Experiments were conducted in which the drag coeffi-
cient was measured over the range 30 to 80 m/s for four types of sand: Ottawa silica
sand, crushed quartz glass, coral sand, and aragonite sand. The sands were tested at
relative densities of 40 and 80%. The drag coefficients for the low density materials
were in excellent agreement with this simple model. The high density material had a
drag considerably larger than predicted, presumably because of particle-to-particle
interactions.

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