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Award

2006 Barringer Medal for Robert M. Schmidt

It is a pleasure to write the Barringer Award citation for our 2006 recipient, Robert M. Schmidt. Robert is a rare combination of bold experimental researcher and an individual with exquisite theoretical insight. Everyone who studies impact craters knows of the Schmidt-Holsapple-Housen scaling relations, and many of us use them on a daily basis.

Robert Schmidt pioneered the idea of using a geotechnical centrifuge to model the formation of impact craters. The concept of using a centrifuge to increase the apparent acceleration of gravity and thus simulate the formation of large structures by small models was developed many years ago, notably by Hans Ramberg in Sweden. However, the thought of actually detonating explosives in a centrifuge spinning at almost 1000 g to simulate crater formation deterred everyone before Robert began his work. After demonstrating the feasibility of this hair-raising experiment, Robert then took another giant step and mounted a two-stage light gas gun on the centrifuge to simulate impact crater formation under controlled conditions. Schmidt thus played a major role in refining our understanding of the effect of gravity on impact cratering. In addition to the scaling relationships, in 1981 he played a major role in demonstrating experimentally that all craters, even those produced at high g, go through a deep transient crater phase—a fact that was highly controversial at that time, and which he resolved by an ingenious series of "quarter space" experiments.

Robert Schmidt

Over his career Robert performed thousands of impact cratering tests. Using the centrifuge he developed at Boeing, he systematically explored the factors that control transient crater size. His data put the flesh on the bones of the theoretical scaling models and provided the first rational basis for computing the formation energy of the Barringer crater in Arizona. Previous to his work, estimates for the formation energy were derived from nuclear explosion craters and suffered from uncertainties about the correct depth of burial. Working with Keith Holsapple, Robert showed how to relate impact to explosion craters and pioneered the "coupling parameter" approach to crater scaling. Working with Kevin Housen he invented innovative methods for simulating the effects of impacts on self-gravitating targets by detonating explosives on targets confined in a pressure vessel. He deserves high marks for his bold, innovative, and extensive experimental investigations of the physics of impact (and explosion) crater formation. Another important contribution was his work that showed that all of the power-law scaling relationships observed in cratering mechanics, such as the rate of transient crater growth, the ejecta velocity distribution, and the dependence of final crater size on impactor size, velocity, gravity, etc., are all interconnected. A single scaling exponent relates all of these quantities providing an elegant unification of the complex processes involved in impact cratering.

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