Advancements in hydrocode modeling of impact crater formation processes on icy worlds

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Icy worlds hold important clues about the formation and evolution of our Solar System. There is a keen interest to explore icy worlds and among other scientific goals, investigate the possibility that some of these objects might host simple microbial life, either in the past or at present. Impacts can form, destroy, and reshape surfaces of solid planetary bodies, and are considered one of the most important and prolific geological processes in the Solar System. Thus, impact craters are the most ubiquitous features on solid planetary surfaces and other small bodies (e.g., asteroids). Impact generated structures can serve as probes into interior and thermal structure of icy bodies. However, directly probing icy bodies is challenging and prohibitively expensive, necessitating analogous studies. In addition to observational techniques to gather clues and fundamental data, hydrocode modeling has the capability to provide a realistic representation of impact crater processes. iSALE, a multi-material, multi-rheology shock physics code, based on the SALE hydrocode (Simplified Arbitrary Lagrangian Eulerian), is a proven tool and has been used in numerous studies to investigate impact crater formation on various surfaces, including icy bodies (Titan, moons of Jupiter, Pluto) and in ice sheets (Mars, Earth). I will discuss recent advancements and studies relevant to hydrocode modeling of formation of impact craters on icy bodies.