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Impact response of helically coiled carbon nanotube foams CHIARA DARAIO, California Institute of Technology, MEHMET KARAKAYA, RAMAKRISHNA PODILA, Clemson University, THEVARAMAN RAMATHASAN, California Institute of Technology, APPARAO RAO, Clemson University — We examined the dynamic response of helically coiled carbon nanotube (HCCNT) foams (K. Yang et al., *Advanced Materials* **20**, 179 (2008)) in an impact testing set up developed in our laboratory, which is based on geometric Moiré interferometry and high-speed microscopic imaging. Dynamic force and displacement histories were measured during the impact, from which the dynamic constitutive response was obtained. HCCNT foams exhibit nonlinear foam-like dynamic stress-strain response with an exceptional ability to mitigate impact forces and dissipate energy through hysteresis. The time-resolved image sequences obtained using high-speed microscopic imaging showed a progressive deformation in a preferred direction along the thickness of the foam during the impact. We attribute this finding to the inherent density gradient introduced in the foams during the chemical vapor deposition process. Due to their energy dissipative and cushioning characteristics, HCCNT foams can find potential use in impact mitigation, packaging and vibration damping applications.

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