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**Three dimensional Origami-based metamaterial** SOROUSH KAMRAVA, DAVOOD MOUSANEZHAD, HAMID EBRAHIMI, Northeastern University, RANAJAY GHOSH, Department of Mechanical and Aerospace Engineering, University of Central Florida, ASHKAN VAZIRI, Department of Mechanical and Industrial Engineering, Northeastern University, HIGH PERFORMANCE MATERIALS AND STRUCTURES LABRATORY TEAM — We present a novel cellular metamaterial constructed from Origami building blocks based on Miura-ori fold. The proposed cellular metamaterial exhibits unusual properties some of which stemming from the inherent properties of its Origami building blocks, and others manifesting due to its unique geometrical construction and architecture. These properties include foldability with two fully-folded configurations, auxeticity (i.e., negative Poisson's ratio), bistability, and self-locking of Origami building blocks to construct load-bearing cellular metamaterials. The kinematics and force response of the cellular metamaterial during folding were studied to investigate the underlying mechanisms resulting in its unique properties using analytical modeling and experiments.

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