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Numerical and experimental investigation for assessing the high strain rate response of nickel based multi-layered honeycomb sandwiches ZHENQI YANG, BAOJUN PANG, LIWEN WANG, School of Astronautics, Harbin Institute of Technology, China 150001, SCHOOL OF ASTRONAUTICS, HARBIN INSTITUTE OF TECHNOLOGY TEAM — The mechanics behaviors of a multi-layered nickel based honeycomb sandwich at quasi-static and high strain rate ranging from 800/s-6500/s were determined by a Instron and uniaxial dynamic compression SHPB experiment respectively. The results of experiment showed strain rate sensitivity at low strain rate portion (0-800/s) while by increasing the strain rate (3400/s- 6500/s); the samples no longer showed noticeable rate sensitivity. Dynamic strain-stress curves showed clearly initial peak strength, flat flow potion and totally compressed ascending part process while a littler peak was appeared during the flat flow potion. A numerical model was developed using LSDYNA software, for investigating the different deformation model under various strain rates with modified by experimental strain-stress curves. Steinberg-Guinan constitution model was utilized to simulate plastic deformation and in-stability status of multi-layered nickel based honeycomb under dynamic compression. In this work the influence of cell wall thickness; layer numbers of sandwich structure; length and height rate of hexahedron cell and influence of skin sheets for dynamic behavior was studied by various finite element models.

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