



921A钢纯剪切帽状试件在SHPB实验中的动态变形

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Dynamic deformations of 921A steel pure shear hat-shaped specimen in SHPB tests

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摘要

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摘要 应用ANSYS/LS-DYNA软件,开展了一系列基于921A钢纯剪切帽状试件的SHPB数值模拟.结合SHPB系统应力波理论,研究不同加载速率 v_0 (或应力脉冲 $\sigma_I(t)$)下,特别是高应变率(约 $10^6 s^{-1}$)下的压杆轴向应变波形以及相应的试件动态变形特性,并对高速撞击下压杆中应变波形的适用性作了相关讨论.

关键词: 爆炸力学 动态变形 SHPB 921A钢 纯剪切帽状试件

Abstract: A series of numerical simulations of SHPB test using 921A steel pure shear hat-shaped specimens are conducted with ANSYS/LS-DYNA and validated by the SHPB tests in the present paper. Integrated with the theory of stress wave in a SHPB system, the wave propagation in the bars and the dynamic deformations of the specimen under different loading rate (or stress pulse) are analyzed, and typical wave shapes are identified for different loading rates. Numerical test of SHPB under ultrahigh strain rate are specially conducted, which is unable to be done realistically. The different deformation and failure of the hat-shaped specimens under different loading rate are distinguished, and the applicability of strain waves in the bars under ultrahigh loading rate is also discussed.

Keywords: mechanics of explosion dynamic deformation SHPB 921A steel pure shear hat-shaped specimen

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