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Applicability Analysis of Chen's Method in the Research of TATB-based PBX Creep Behavior

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Abstract: To improve the experimental efficiency of creep behavior research of polymer bonded explosive (PBX) for the further study of the long-term service performance, the adaptability of Chen's method in the experimental study of PBX creep behavior was investigated and analyzed. The uniaxial compression creep experiments of a TATB-based PBX material under the stress levels of 5.5, 11, 16.5 MPa and 22 MPa were carried out by Chen's multistep loading method and separate loading method, respectively. Chen's data processing method is applied to deal with the creep test results of multistep loading, the creep curves under different loading were obtained, and compared with the creep curves obtained by separate loading method. Results show that creep curves obtained by both methods under the stress levels of 5.5 MPa and 11 MPa are coincident, but the ones obtained by Chen's method are lower than the ones obtained by separate loading method under the stress levels of 16.5 MPa and 22 MPa, which indicates that Chen's method can be well applied to the creep experimental study of the material under low stress level, and can be applied to the study of long-term service properties further. While under high stress level, obvious creep hardening effect is observed so that creep curves from Chen method are only in accord with the real separate ones at creep deformation stage but discount occurs in the stage of instantaneous elastic deformation.

Key words: polymer bonded explosive(PBX); creep; Chen's method; multistep loading method; creep hardening
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