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Influence of F2311 Content on Creep Performance of TATB-based Polymer Bonded Explosive

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Abstract: In order to investigate the effects of fluoroelastomer (F2311) content on the creep performance of TATB-based polymer bonded explosive (PBX), 4 PBX formations modified by adding 0.05, 0.1, 0.2, 0.4 wt% F2311 were prepared, and their three-point bending creep behavior were studied by dynamic mechanical analyzer. Results show that the addition of 0.4% F2311 make the creep resistance performance of TATB-based PBX decrease, and with the decrease of F2311, the creep resistance performance of PBX modified formulation enhances. When F2311 content decreases to 0.05 wt%, the creep strain of modified formulation is slightly smaller than original formulation at 60 °C/6 MPa. Meanwhile, six-element model was used to simulate the creep behaviors of PBX. The constitutive equations of creep curves were obtained. The predicted theoretical results coincide quite well with the experimental data. Based on time-temperature superposition principle, the master curves of TATB-based PBX and its modified formulation are obtained at 30 °C. Results show that compared with original formulation PBX, the long-term creep resistance performance of modified formulation PBX with 0.05 wt% F2311 is enhanced.

Key words: applied chemistry; TATB; polymer bonded explosive (PBX); fluoroelastomer; creep performance; time-temperature superposition

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