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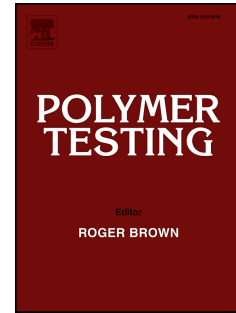
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Experimental study on uniaxial ratchetting-fatigue interaction of polyamide-6

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ABSTRACT

The whole-life ratchetting and fatigue failure, as well as the ratchetting-fatigue interaction, of polyamide-6 (PA6) were investigated by performing a set of uniaxial stress-controlled cyclic tests at room temperature and with different stress levels. The effects of mean stress, stress amplitude and stress ratio on the evolution of ratchetting strain and the fatigue life of PA6 are discussed. Simultaneously, the evolution of damage variable, which is defined as a function of equivalent modulus, is summarized to reflect the interaction of ratchetting and fatigue damage. The experimental results show that the uniaxial whole-life ratchetting and fatigue life of PA6 are sensitive to the mean stress, stress amplitude and stress ratio. The evolution of damage variable and its dependence on the stress level are similar to that of whole-life ratchetting, and present a tri-phased feature with respect to the damage rate. By comparing the fatigue lives obtained in the asymmetrical and symmetrical tests, a detrimental effect of ratchetting deformation on the fatigue life of PA6 is found.

Keywords: Polyamide-6; Uniaxial; Stress-controlled cyclic loading; Ratchetting; Fatigue.

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