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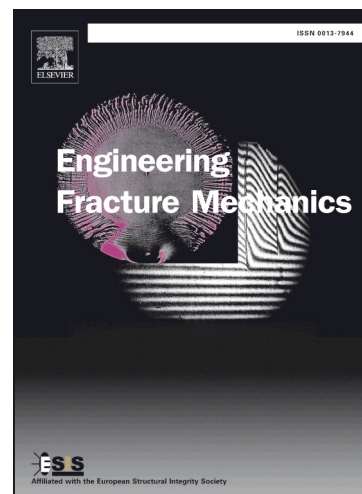
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## The influence of static crack-opening stress on the threshold level for shear-mode fatigue crack growth in bearing steels

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**Abstract.** An investigation was conducted into the influence of statically-applied, mode I, crack-opening load on the threshold condition for propagation of a shear-mode fatigue crack in a bearing steel. Torsional fatigue test was carried out at an  $R$  of  $-1$  using a hollow cylindrical specimen into which a semi-elliptical, small slit was axially introduced. A static axial compressive stress was simultaneously applied to suppress crack branching. A coplanar, shear-mode, non-propagating fatigue crack emanating from the slit was attained by appropriate control of shear stress amplitude. Internal pressure was then applied to generate a hoop stress as a static crack-opening stress,  $\sigma_{\theta \text{ static}}$ . Consequently, the threshold shear-mode stress intensity factor range,  $\Delta K_{\text{th}}$ , was significantly decreased with increase of the static mode I stress intensity factor. To further understand the contribution of  $\sigma_{\theta \text{ static}}$  to the reduction in  $\Delta K_{\text{th}}$ , microstructural observations for the cross-sections of a non-propagating crack were conducted using a scanning electron microscope in conjunction with the electron backscatter diffraction analysis. The results

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