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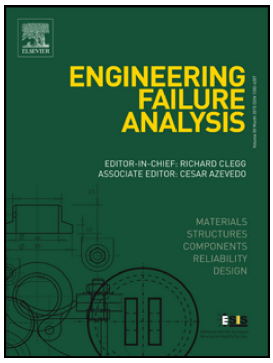

Comparative study on the fatigue criteria for the prediction of failure in engine structure

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Comparative study on the fatigue criteria for the prediction of failure in engine structure

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Abstract

Recently, authors have developed a numerical procedure in order to predict the fatigue failure of the cast iron cylinder head [*Three dimensional analysis of low cycle fatigue failure in engine part subjected to multi-axial variable amplitude thermo-mechanical load, Engineering Failure Analysis 62* (*2016*) *128–141*]. The aim of the present study is a comparative investigation on the application of the different equivalent stress and strain approaches and critical plane fatigue theories in order to accurately determine the critical zone and life cycle in the failed cylinder head. The experimental observations in engine durability test ISO 8178 E5 and some multi-axial fatigue criteria are explained in detail. Then the fatigue life predictions obtained through the developed numerical procedure are compared with the observations. Results reveal that Morrow and SWT as equivalent strain-based criteria and Fatemi-Socie as critical plane criterion would lead to more accurate predictions in comparison with others. However, in the case of engine structure analysis, there is no considerable superiority between the two last groups of multi-axial fatigue models.

Keyword: critical plane theory; equivalent strain-based criteria; fatigue analysis; engine structure.

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