HDM
HRVATSKO DRUŠTVO ZA MEHANIKU
ZAGREB - OSIJEK - RIJEKA - SL. BROD - SPLIT

Predavanje u HDMu:

Fatigue and Fatigue Limit of Spring Material

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ABSTRACT

An analysis of the fatigue strength of parabolic springs fabricated with 51CrV4 steel was carried out by using a fracture mechanics methodology and quantifying the applied driving force and the resistance for different configurations of loading, inclusion sizes and residual stresses. Surface and internal initiation processes are analysed and compared considering in the first case the influence of the residual stresses introduced by shot peening. It is shown that the fracture process is the result of the competition between two fracture processes initiated either on the surface or internally, and that the benefit of residual stresses has a limitation given by the depth to which they can be introduced. Besides, it seems that for the analysed configurations, the variables to be optimized in the processing of the springs are the maximum size of the expected defects and the fatigue propagation threshold for long cracks. The analysis shows that it would also be important, in the search to improve the resistance of the springs, to improve the propagation threshold of long cracks. This threshold generally decreases with increasing steel strength, but improvements could be explored by increasing the microstructural size associated with the threshold definition process, in many cases associated with the tortuosity or roughness generated by crack tip propagation.