

Numerical Simulation for Self-Loosening Phenomenon Analysis of Bolt Joint under Vibration

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Abstract : In this paper, the finite element method (FEM) is utilized to simulate the comprehensive process including tightening, releasing and self-loosening of a bolt joint under transverse vibration. Following to the accurate geometry of helical threads, an absolutely hexahedral meshing is implemented. The accuracy of simulation process is verified and validated by comparison with the experimental results on clamping force-vibration relationship, which shows the sufficient correlation. Further analysis with different amplitude and frequency of transverse vibration is done to determine the dominant factor inducing the failure.

Keywords : bolt self-loosening, contact state, finite element method, FEM, helical thread modeling

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