

MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
Space Vehicles – Mechanical/Thermal/Fluidic Systems (7)

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MODELING OF HYDROGEN EMBRITTLEMENT AT STEADY STATE AT HIGH TEMPERATURE  
USING A COMMERCIAL FINITE ELEMENT PROGRAM

**Abstract**

Considering a quick set-up of numerical simulations of hydrogen embrittlement, the implementation of hydrogen embrittlement models into commercial finite element programs is an attractive alternative to in-house developed hydrogen embrittlement modeling codes. The purpose of this paper is to present a simple methodology to model hydrogen embrittlement of a structure through the implementation of a hydrogen embrittlement model based on the hydrogen-induced enhanced plasticity (HELP) mechanism into the commercial Finite Element program ANSYS. The developed approach considers a hydrogen distribution at steady state conditions for a non-uniform temperature distribution. The accuracy of this approach has been assessed by performing finite element simulations of hydrogen embrittlement of a structure made of Inconel X-750 at high temperature and at steady state.