Application of the substructure method for thermal stress-strain assessment of a liquid-propellant rocket engine combustion chamber

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The paper specifies the procedure of a finite element analysis used to assess the stress-strain state of a liquid-propellant rocket engine combustion chamber and a nozzle end. A cyclic load for three steps is examined. The ANSYS finite element software is used during the analysis. The authors consider both the substructure method and a cyclic symmetry in order to reduce the model size significantly. The obtained results showed the planning plastic zones, which are critical for low-cycle fatigue. The procedure and numerical models were tested.

Keywords: *finite elements method, mathematical modeling, substructure, cyclic symmetry, stress-strain state, radioactively cooled nozzle, nozzle end, combustion chamber, liquid-propellant rocket engine.*

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