COMPARATIVE ANALYSIS OF A TRANSIENT HEAT FLOW AND THERMAL STRESSES BY ANALYTICAL AND NUMERICAL METHODS

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ABSTRACT

The study of heat flow problems is of extreme importance in engineering, there is a need to know the temperatures imposed and generated, when appropriate, in the structural parts to be able to evaluate the stresses that can arise due to the thermal variations. These stresses arise due to imposed constraints, ie bodies can not move freely and consequently undesirable cracks may arise when the stresses are greater than the resistive capacity of the stressed parts. The analysis of these problems can be done in both analytical or numerical way, with the use of calculation methods, such as the Finite Difference Method (FDM) and the Finite Element Method (FEM), with aid of computational programs such as MATLAB, PYTHON and ANSYS, as used in this work. The results presented here show simple cases of transient thermal variation and thermomechanical coupling by two methods of analysis, aiming at the validation of the numerical methods and softwares used. The solutions were satisfactory, the temperatures and stresses were coincident for different methods, making possible to start studying more complex problems with confidence in the implemented code.

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