General Interval FEM Program Based on Sensitivity Analysis Method

Andrzej Pownuk

Department of Mathematical Science,
The University of Texas at El Paso
Texas, El Paso, TX 79968
E-mail: ampownuk@utep.edu

Abstract

Today there are many methods for solution of equation with interval parameters [1]. Unfortunately there are very few universal and efficient methods which can be directly applied for solution of complex engineering problems.
Sensitivity analysis method [2] gives very good inner approximation of the exact solution set. This method was implemented in C++ language by the author and the program can be recompiled on Windows, Linux and Solaris operating systems. The program is able to solve 1D, 2D and 3D linear problems of electrostatics with interval parameters. In order to describe structure with uncertain parameters special scripting language was applied. The program is able to solve problems using endpoint combination method and Taylor expansion method. Additionally it is possible to solve problems with uncertain functional parameters [3]. In order to do that it is necessary special finite elements.
The program is very universal and can be applied to the solution of complex engineering problem. The program is a part web application, which is written in php language and can be run on the author's web page http://andrzej.pownuk.com. The program is object oriented and can be very easily extended to the solution of more complicated problems like for example nonlinear problems of computational mechanics.

References

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