Parallel Methods for Solution of Equations with Uncertain Parameters

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In many situations it is necessary to take into account uncertainty of parameters. Uncertain parameters can be modeled by using random numbers, stochastic processes, sets (e.g. intervals, ellipsoid), random sets etc. Mathematical models of linear elasticity problems (including frames, plates, and shells) can be express in the form of system of differential equations on manifolds. Usually it is not possible to get exact solutions of these equations, because of that it is necessary to apply some discretization techniques. One of the most popular are the Finite Difference Method, the Finite Element Method, and the Boundary Element Method. If only very limited amount of information is available, then in order to model uncertainty the interval parameters can be applied. The authors of this presentation have extensive experience in the solutions of equations with the interval parameters. Existing computational methods can be significantly speed up by parallel computing. In this presentation applications of the MPI library and GPU computing will be presented.