

A sophisticated tool for sensitivity analysis of various types of discrete systems of applied sciences and engineering using finite element techniques

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Discrete Systems are divided into different types based on their characteristics. The spring system has the displacement according to its elasticity and force produced on it. On the other hand the resistor system has the current flow according to its resistance and the voltage given to it. The beam system has the displacement with respect to its truss and the load. The system can be modelled using finite element method and its assembled matrix must be adjusted due to any change of physical properties of the system. Analyzers of such system need flexible tool which must be incorporated with sensitivity analysis of the system. There are two procedures called "FEM 2.1" and "TRUSS ANALYSIS" available to handle such Discrete Systems. These softwares have no features adopted to satisfy the user to handle the sensitivity analyses of the systems instead those provides solution to a fixed system. User specified input parameter gives output in some vector form. As this output is not mapped on the original system, finding solution to a specific location or common node of element connectivity in the system requires much time. As a result, the software cannot be used for a large system and also very difficult to understand the behaviour of a large system.

To overcome the problems, in this paper, a new graphical user interface is developed and which provides finite element solution for various types of a large discrete system in the same interface. This tool has been added advanced features such as user can modify the structure of the system or the input parameter (material constants, external forces, etc) after finding the solution of the original system. The finite element solution of the modified system could be updated and mapped automatically on the simulated system. Another advantage of this tool is that users need not have complete knowledge of finite element method.