Technical documentation

Version 2.0

FEM Toolbox for Solid Mechanics: Technical Documentation

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Nomenclature

BC	Boundary Condition
DBC	Displacement Boundary Conditions
DOF	Degree of Freedom
FEM	Finite Element Method
GUI	Graphical User Interface
MFC	Multi-freedom Constraints

1 Copyright

2 Introduction

The FEM Toolbox was conceived as a teaching tool for students of structural dynamics in 2004 and gradually grew up into a versatile tool for static, transient and modal analysis of linear problems in solid mechanics based on a library of basic 2D and 3D finite elements.

This document describes the structure, functionality and the main concepts of the software package. There is no dependency on other Matlab toolboxes. The main GUI runs from the Matlab command window.

The software manual is divided into several sections:

1. Section 4 discusses the basic GUI functionality. It outlines the operations controlled through the main GUI (buttons and check-boxes).
2. Section 5 discusses the file structure of the Toolbox: directory structure and list of files.
3. Section 6 provides the content of the input files. The output of the input files is a data structure in_data, which stores all information about the geometry, element properties, loads, and constraints of the system.
4. Section 7 outlines the library of the finite elements used in the Toolbox.
5. Section 8 provides examples of several input files, discussing the input parameters and results.

I hope the Toolbox will be useful for students, engineers, and researchers, who use FEM in design and development of their products, and perform structural simulations of various systems.

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