

Programming the Finite Element Method with Matlab

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3rd October 2002

1 Introduction

The goal of this document is to give a very brief overview and direction in the writing of finite element code using Matlab. It is assumed that the reader has a basic familiarity with the theory of the finite element method, and our attention will be mostly on the implementation. An example finite element code for analyzing static linear elastic problems written in Matlab is presented to illustrate how to program the finite element method. The example program and supporting files are available at <http://www.tam.northwestern.edu/jfc795/Matlab/>

1.1 Notation

For clarity we adopt the following notation in this paper; the bold italics font v denotes a vector quantity of dimension equal to the spatial dimension of the problem i.e. the displacement or velocity at a point, the bold non-italicized font d denotes a vector or matrix which is of dimension of the number of unknowns in the discrete system i.e. a system matrix like the stiffness matrix, an uppercase subscript denotes a node number whereas a lowercase subscript in general denotes a vector component along a Cartesian unit vector. So, if d is the system vector of nodal unknowns, u_I is a displacement vector of node I and u_{iI} is the component of the displacement at node I in the i direction, or $u_{iI} e_i$. Often Matlab syntax will be intermixed with mathematical notation

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Programing The Finite Element Method With Matlab

M Carnoy



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