T005: Elastic-Plastic DAT Files

Introduction

This document defines the DAT files that should be considered for elastic-plastic simulations.

Problem Description

Simulations that include elastic-plastic objects may have trouble with convergence or accuracy. DAT files can be used to improve the reliability and results.

Background Information

Special DAT files should be considered for simulations that include one or more elastic-plastic objects. Use of the each particluar DAT file depends on the system and situation. Appropriate DAT files should be placed in the working folder in order to trigger their functionality. These DAT files are blank text files and are defined below.

DEF_EP.DAT

In 3D simulations with elastic-plastic objects, iteration convergence is determined by the force error norm. Both the force and velocity error norms will be used for iteration convergence when the DEF_EP.DAT file is present. The addition of the velocity error norm improves accuracy and often prevents mesh distortion or failure due to poor velocity profiles. Both the force and velocity error norms are used in 2D simulations by default.

MDIR.DAT

The Newton-Raphson method is recommended for elastic-plastic simulations. If convergence is difficult, then DEFORM switches to Direct Iteration by default. This is okay for a few isolated steps. Yet, elastic-plastic solution accuracy can be negatively affected if many steps in a row are completed using Direct Iteration. Thus, MDIR.DAT can be utilized to prevent the automatic switch from Newton-Raphson to Direct Iteration.

Solution

The following DAT files are recommended for 2D simulations.

- MDIR.DAT

The following DAT files are recommended for 3D simulations.

- DEF_EP.DAT
- MDIR.DAT

Related Information

None