Explicit LS-DYNA analyses of confined cylinder with MAT_CDPM (MAT_273) using tetrahedral meshes

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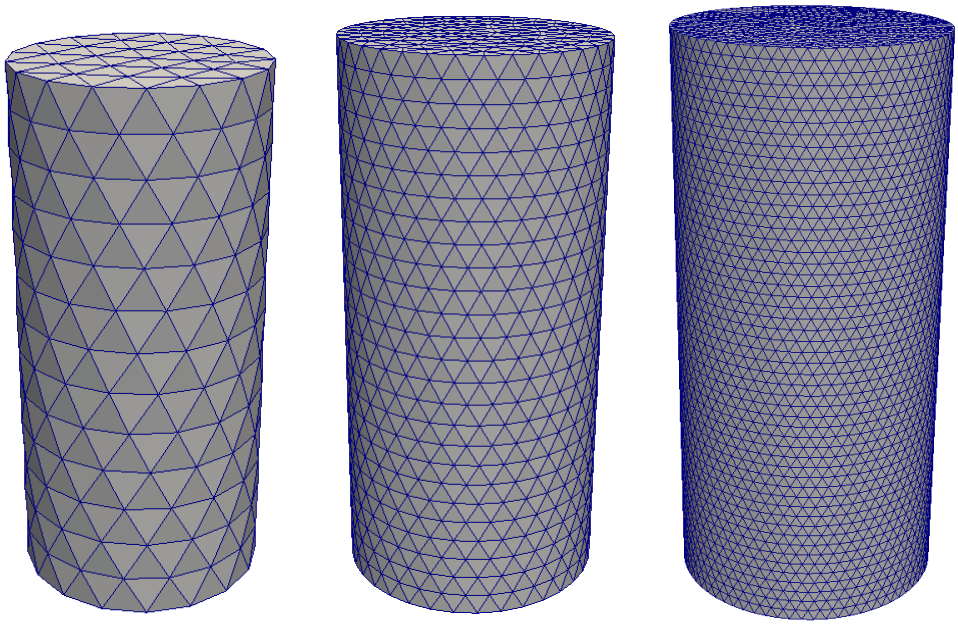
1 Introduction

This document describes the results obtained from a set of analyses of a confined cylinder with release 9.0.1 of LS-DYNA using MAT_CDPM (MAT_273. MAT_CDPM (MAT_273) is based on work published in Grassl and Jirásek (2006); Grassl et al. (2013, 2011). The aim of these analyses is to demonstrate that the response obtained with MAT_CDPM for the confined cylinder in compression is independent of the mesh size. More information on MAT_CDPM in LS-DYNA can be be found on:
http://petergrassl.com/Research/DamagePlasticity/CDPMLSDYNA/index.html

2 Confined compression of a cylinder with explicit LS-DYNA using tetrahedral meshes

The geometry, loading setup and material properties are chosen according the experiment reported in Imran and Pantazopoulou (1996). The analysis consists of two steps. First a hydrostatic compression stress of 2.15 MPa is applied. In the subsequent step the lateral confinement is kept constant while the axial shortening is increased. The three meshes are shown in Figure 1. The load-displacement curves for the three explicit analyses are shown in Figure 2. Here, load is the axial compressive force and displacement is the axial



(a) (b) (c)

Figure 1: Confined cylinder: (a) Coarse, (b) medium and (c) fine tetrahedral meshes.

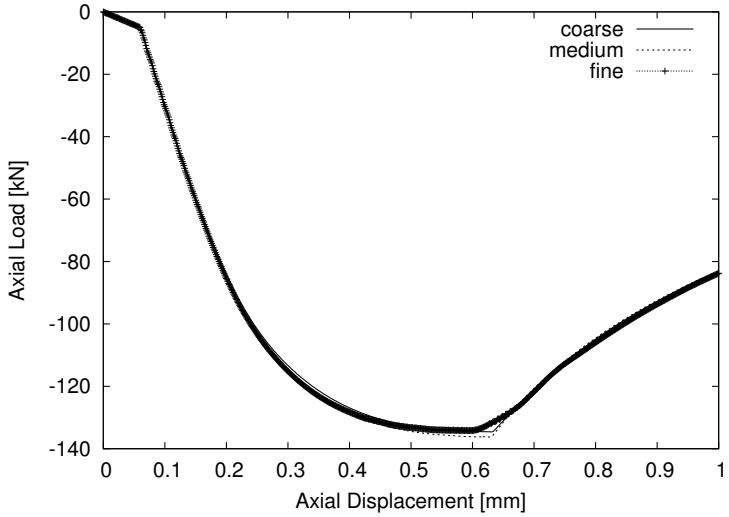


Figure 2: Load versus displacement for three tetrahedral meshes using MAT_CDPM together with the explicit analysis.

shortening of the cylinder. The results obtained with CDPM2 in confined compression are independent of the mesh size, because the displacements are not localised and the compressive response of the constitutive model is formulated to be independent of the element size.

References

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