README

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May 28, 2019

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This is a simple MPM code write in C, the main purpose of this code is to understand the basics concepts of a MPM code. I also write this lines to keep some order in my ideas during this crazy years.

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1 Physical problem

1.1 Balance of momentum (Equilibrium)

$\rho \cdot \partial_{\mathrm{t}}\ \mathrm{v} + \partial_{\mathrm{x}}\ \sigma = \rho \cdot \mathrm{b}$

1.2 Compatibility

1.3 Constitutive response

$\sigma = 2\mathrm{GE} + \lambda\ \mathrm{tr(E)}\ \mathrm{I}$

2 Material Point Method

3 Proposed tests

3.1 Simple propagation of a shock wave in a 1D media

Here we solve the transport equation with a time integrator called Two-Step Taylor-Galerkin that stabilize the solution avoiding the formation of spurious oscillations during the transport. For the spatial discretization will be used 1D li

$\partial_t\ u + c \cdot \partial_x\ u = 0$

The algorithm is as follows :

1. Transfer information to the Gauss-Points : $u_{GP}^n = \sum_{i=0}^{N} N(x_i) \cdot u_i^n$
2. Get the solution in the Gauss-Points for $t = n + 1/2$: $u_{GP}^{n+1/2} = u_{GP}^n - \Delta\ t/2 \cdot \sum_{i=0}^{N} \partial\ N(x_i) \cdot u_i^n$
3. Get the solution in the nodes for $t = n + 1$:

3.2 Simple propagation of a shock wave in a 1D elastic media using the formulation σ - v

4 List of new items