

RamSeries - Validation Case 22

Contact Patch Test



RamSeries

Version
15.1.0

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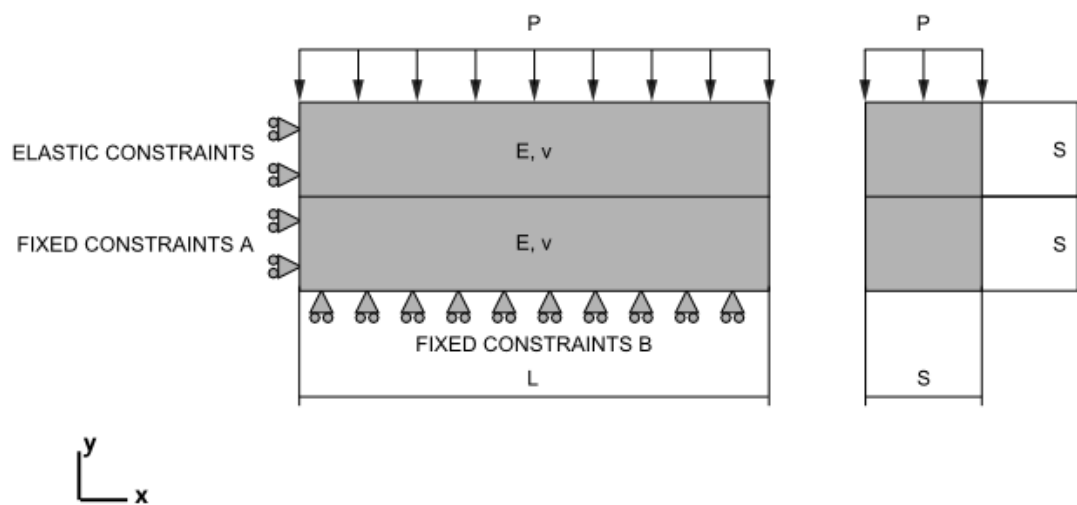
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1 Validation Case 22 - Contact Patch Test

Model Description

A contact implementation should be able to exactly transmit a spatially constant stress field from one body to another along an arbitrary non-conforming contact surface. This ability will be checked by the so-called contact patch test.

Following, the configuration of the problem is shown.



Parameters:

$$L = 5 \text{ mm}$$

$$S = 1 \text{ mm}$$

$$P = 100 \text{ N/mm}^2$$

$$E \text{ (Young modulus of material)} = 10^6 \text{ N/mm}^2$$

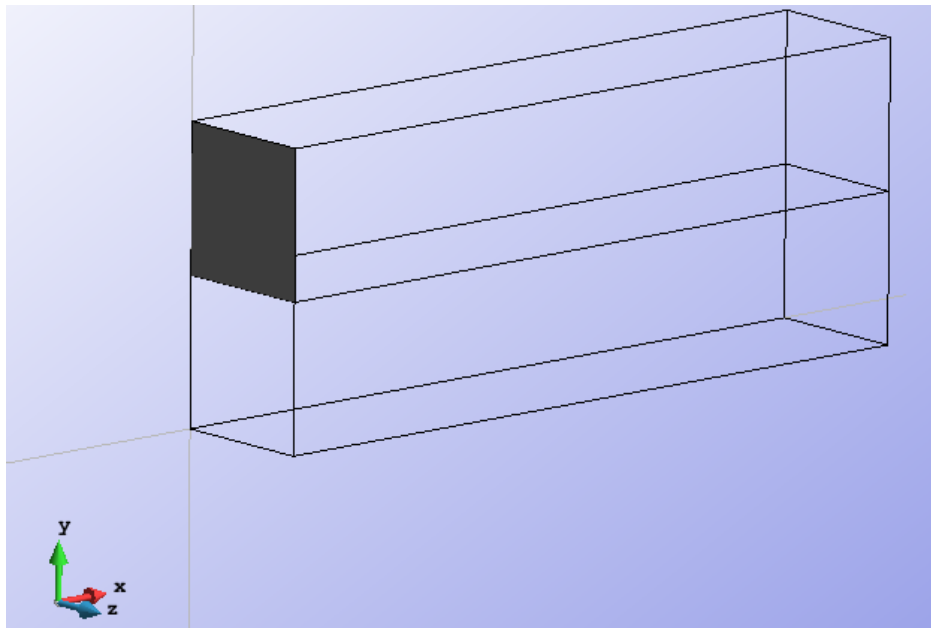
$$\nu \text{ (Poisson modulus of material)} = 0.0$$

Elastic constraints:

$$X = 10^6 \text{ N/mm}^3$$

$$Y = 0$$

$$Z = 10^6 \text{ N/mm}^3$$

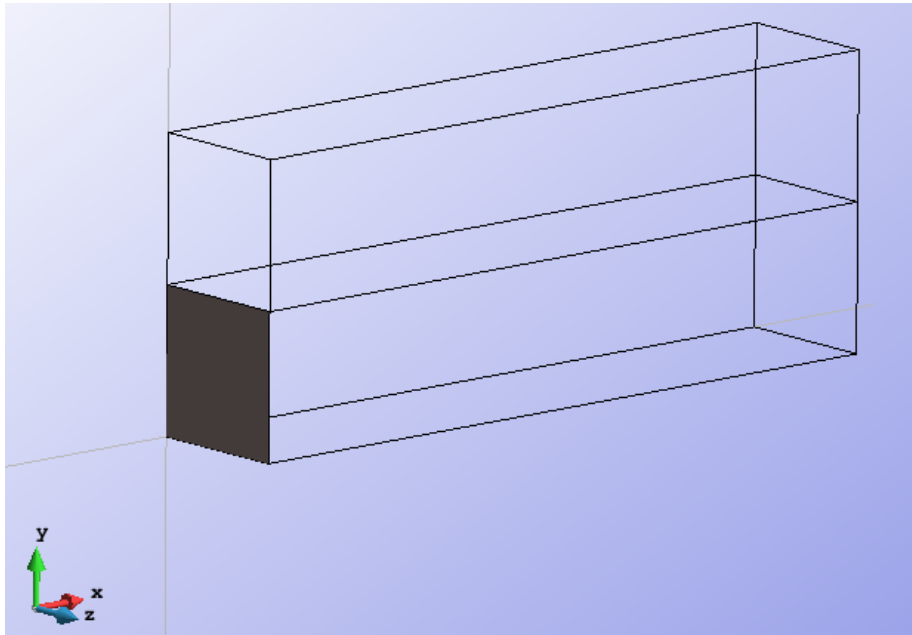


Fixed constraints A:

$$X = 1$$

$$Y = 0$$

$$Z = 1$$

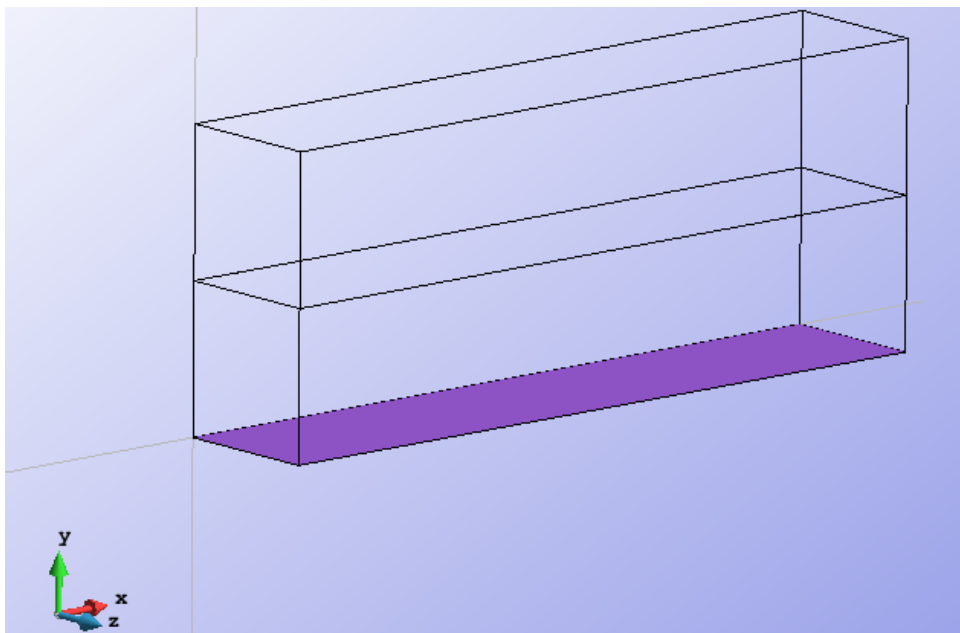


Fixed constraints B:

$$X = 0$$

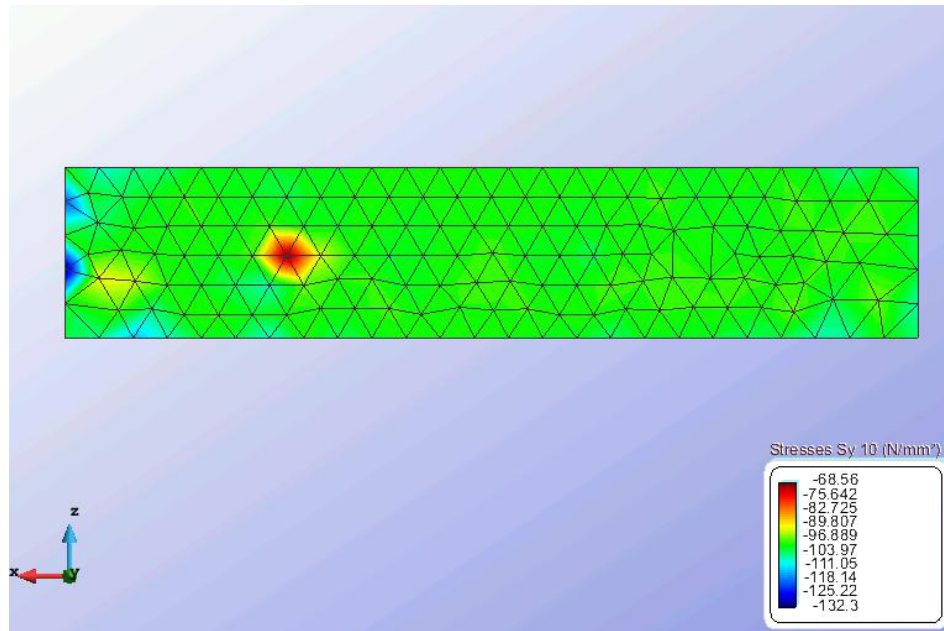
$$Y = 1$$

$$Z = 1$$

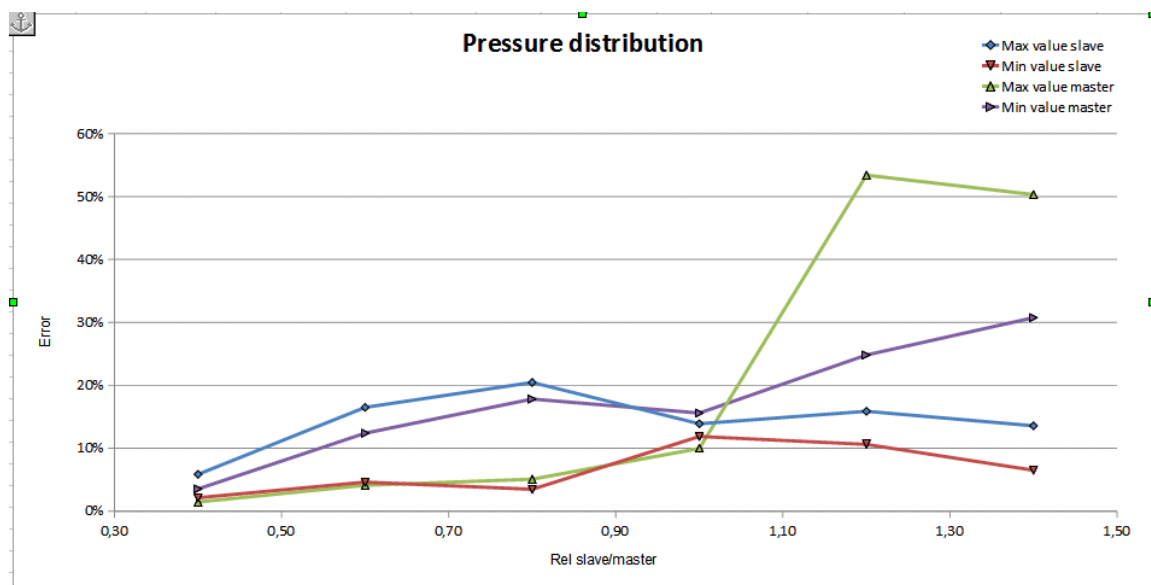


Results

The normal pressure should be 100 N/mm² in all surface.

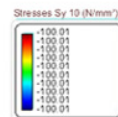
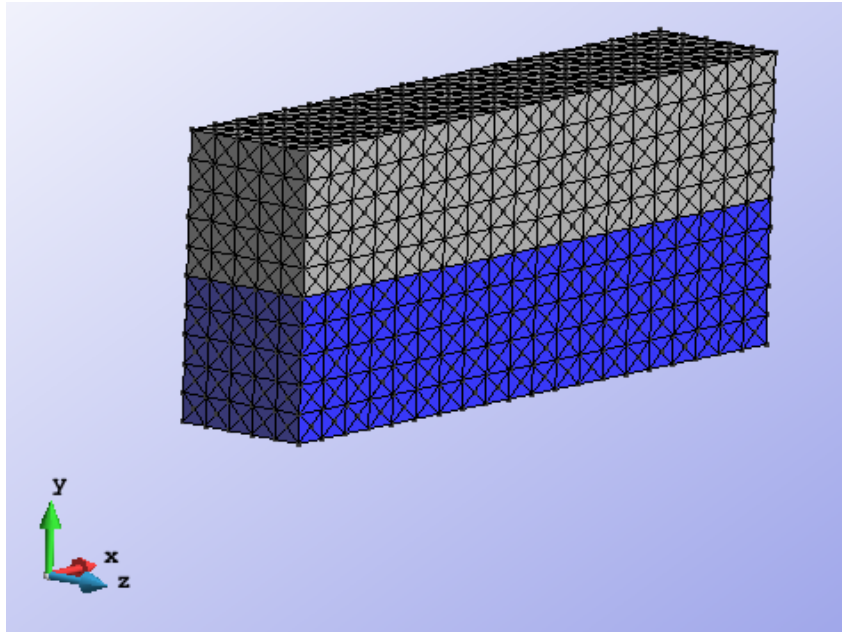


There are some points where the normal pressure is very different than the correct value because slave and master meshes are not coincident. The following graphic shows that results get better if slave elements size is minor than master elements size.



On the other hand, if slave and master meshes are coincident, the results are correct.

In this case, a structured mesh has been used. Following the mesh used is shown, and the results got using this mesh:



References

- [1] S. Hartmann, J. Oliver, R. Weyler, J.C. Cante, J. A. Hernández. A contact domain method for large deformation frictional contact problems. Part 2: Numerical aspects.

Validation Summary

CompassFEM version	15.1.0
Tdyn solver version	15.1.0
RamSeries solver version	15.1.0
Benchmark status	Successfull
Last validation date	27/11/2018