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Objective mortar formulation for beam-to-beam contact

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A new model for beam-to-beam contact analysis has been developed. It considers segment-to-segment contacts and uses distributed gap function and force along the centreline. It is based on a new definition of the gap function which, as proposed, eliminates the bias in the classic definition towards the mortar side beam. The proposed gap function is based on the equidistance curve between the beams' centrelines. An algorithm for computation of the 3D equidistance curve is discussed in detail as its robustness is of paramount importance to the efficiency of the method. Although this new gap function definition is not limited to a certain type of a segment-to-segment contact model we implement it here following the Mortar method based on the Lagrange multipliers discussed in [1] and [2] as it is a direct continuation of our research. Virtual work is derived from the contact potential for the implementation in the Finite element method. Only friction-less static analysis is discussed although an extension to dynamics is possible if using an appropriate non-smooth solver.

REFERENCES

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