

# A multiarea frictionless contact method for planar mechanism

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Traditional discretizations of the contact interface have led to three primary schemes: node-to-node (NTN) [1], node-to-segment (NTS) [2], and segment-to-segment (STS) [3]. Referring to Fig. 1, the proposed method can be divided into three phases: a) – contact detection and calculation of the intersection area and its center of gravity, b)– calculation of the direction and magnitude of the global contact forces, c)– decomposition of the latter into nodal forces. The final contact force vector is thus fully defined by three elements: (i) its magnitude, proportional to the intersection area; (ii) its direction, given by the weighted average of the slave-to-master vectors; and (iii) its application point, located at the centroid of the intersection area. These components also allow the force to be decomposed into nodal contributions, enabling a detailed analysis of interactions in both rigid and flexible systems. Extensions to multiarea contact for non-conformal conjugate pairs has been considered. The method was tested on simple planar mechanisms and validation with Hertz theory and the STS method has been included.

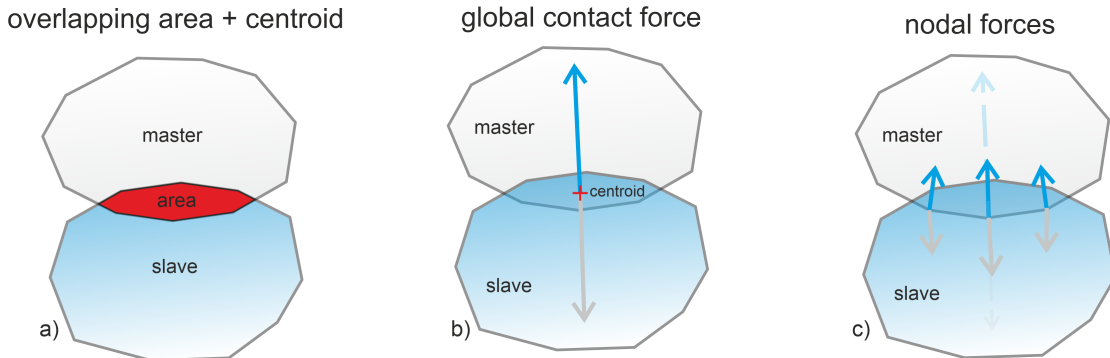


Figure 1: (a) computation of the overlapping area; (b) computation of the global force applied at the area centroid; (c) decomposition of the global force into an equilibrated system of nodal forces.

## References

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