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On the application of interpolation multipoint constraints within the floating frame of reference for the reduction of flexible multibody systems

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Interpolation Multipoint Constraints (MPCs) define the displacements of a node in function of other displacements of a discretized part. In FEA, this element is used for distributing applied loads or to include suspended masses. In flexible multibody systems MPCs are employed to create joints. For their application within a Floating Frame of Reference Formulation [4], some dependent nodes [1, 2, 3] must be selected. This way of choosing dependent degrees of freedom (Dof) seems to be arbitrary and entrusted to experience or empirical selection criteria. The solution proposed in this article exploits the feature of the reference conditions (RCs), i.e. the conditions necessary to eliminate the redundancy of the elastic field in a Floating Frame of Reference Formulation. Instead of selecting only some nodes of the interface, we propose to employ all interface Dofs. Applying the RCs to the interpolation MPC equations it is possible to express the virtual node displacement in terms of the whole interface displacement. This strategy allows to combine interface reduction with any set of RCs , not only the mean-axis RCs, as exploited in the classic Craig-Bampton method [5].

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