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AN UNBIASED COMPUTATIONAL CONTACT FORMULATION FOR 3D FRICTION

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A new computational contact formulation is presented and analyzed for large deformation frictional contact [1]. The new formulation uses an unbiased treatment of the two neighboring contact surfaces considering the two-half-pass contact algorithm that was originally derived from pairwise surface potentials [2]. This algorithm does not enforce traction continuity at the contact interface explicitly, but rather satisfies it intrinsically to high accuracy, as is shown. A new 3D friction formulation is also proposed that is a direct extension of the 1D setup, expressing the friction variables in the parameter space used for the curvilinear surface description. The new formulation resorts to classical expressions in the continuum limit. The current approach uses C^1-smooth contact surface representations based on either Hermite or NURBS interpolation. A penalty regularization is considered for the impenetrability and tangential sticking constraints. The new, unbiased friction formulation is illustrated by several 2D and 3D examples, which include an extensive analysis of the model parameters, a convergence study and the comparison with a classical biased master/slave contact algorithm.

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