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PREDICTOR-CORRECTOR CONTACT ALGORITHM BETWEEN MESHLESS AND FINITE ELEMENT METHODS.

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In Computational Contact Mechanics, both explicit and implicit schemes can be used to enforce the impenetrability constraint among deformable and/or rigid bodies [1]. In particular, explicit integrators are often advantageous for the solution of high-velocity impact problems, and others that take place in a short period of time. In this context, contact detection algorithms are often employed that are based on master-slave discretizations of the potential contacting surfaces, with artificial penalty stiffness among them [2].

In the current work we study explicit algorithms for multibody problems that include contact interactions among bodies discretized with finite elements and meshfree methods. This type of situations are extremely common for impact and fragmentation simulations where a stiffer part is discretized with finite elements while the impactor is represented by a cloud of points. Instead of the standard penalty strategy for imposing the impenetrability, we base our solutions in a predictor-corrector update inspired by the work of [3]. This approach, modified to account for the different discretizations in contacting bodies, avoids the definition of the stiffness parameter and is easy to parallelize, making it very suitable for large scale impact simulations.

In the presentation we will describe the scheme, illustrate the properties of the integration procedure, and show examples of contact simulations with and without friction.

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