

A MOLLIFIED VERSION OF THE KUWABARA-KONO MODEL FOR 2ND ORDER CONVERGENCE IN DEM

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ABSTRACT. The Discrete Element Method (DEM) is a technique widely used to simulate multi particle systems, in particular granular materials [1]. For conservative systems, the integration of the equations of motions is often performed via a Verlet-type method of order two [2]. However, when dissipative forces are included, such as in simulations of granular materials, the Verlet method no longer behaves as a second order method. For instance, when using the popular Kuwabara-Kono force scheme [3], the order of the Verlet method decreases to 1.5. In this work, we propose a regularization of the Kuwabara-Kono force model via mollification. We show numerically that the Verlet method combined with this regularized force model can integrate collisions with second order accuracy and that the coefficient of restitution of the system tends to increase as a function of the regularization parameter.

Keywords: discrete element method, Verlet Method, Kuwabara-Kono force, mollifier

Mathematics Subject Classifications (2010): 76T25, 65L05, 65L70.

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