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A NEW CONTACT DETECTION ALGORITHM FOR THREE-DIMENSIONAL NON-SPHERICAL PARTICLES

C.W. Boon¹, G. T. Houlsby¹ and S. Utili²

¹Department of Engineering Science, Oxford University Parks Road, Oxford OX1 3PJ, United Kingdom

²School of Engineering, University of Warwick, Coventry CV4 7AL, United Kingdom; formerly at University of Oxford.

ABSTRACT

A new contact detection algorithm between three-dimensional non-spherical particles in the discrete element method (DEM) is proposed. Houlsby previously proposed the concept of potential particles where an arbitrarily shaped convex particle can be defined using a 2nd degree polynomial function [1]. The equations in 2-D has been presented and solved using the Newton-Raphson method. Here the necessary mathematics is presented for the 3-D case, which involves non-trivial extensions from 2-D. The polynomial structure of the equations is exploited so that they are second-order cone representable. Second order-cone programs have been established to be theoretically and practically tractable, and can be solved efficiently using primal-dual interior-point methods [13]. Several examples are included in this paper to illustrate the capability of the algorithm for particles of various shapes.

Keywords: DEM; non-spherical; polyhedral; contact detection; potential particles;

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