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A Novel Contact Model Based on Volumetric Information

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In this paper, a novel contact model is presented which includes normal contact force and damping, rolling and tangential resistance force. A modified Winkler elastic foundation model is introduced to obtain the pressure distribution across the contact area. The contact force is derived analytically by integrating the pressure distribution over the contact area. The resulting model features a contact stiffness proportional to the contact area and leads automatically to the correct selection of the point of action of the force, which is shown to be proportional to the interpenetration volume. The proposed model is not restricted to contact situations where the bodies have non-conforming geometries, but can be used for any geometry with reasonably flat contact area. A numerical simulation of a sphere impacting on the inside surface of a cylinder is presented and demonstrates ball motion is eventually stopped by the frictional effects.

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