SOME REMARKS ON CONTACT MODELS OF FINGERPAD - PART II: SURFACE STRESSES

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Abstract: The contact between human fingerpad during object grasping is modelled as a mechanical contact between two dissimilar spheres, normally loaded. Due to different deformations and micro-slip, shear stresses are induced on surface, generating radial and circumferential stresses in the contacting bodies. The equivalent Huber-Mises-Henky surface stress is computed by applying superposition principle, [1]. Due to the dissimilarity between contacting materials and the friction coefficient the surface stresses are more important than in the classical Hertzian contact, [4].

When two dissimilar elastic spheres in contact are normally loaded, the relative displacement at the interface induces a shear stress oriented on radial direction. This traction modifies the stress state and produces an annular microslip region and a central circular stick region, with dimensionless radius, as shown by Hills.et al., [2], [3].

A numerical program was proposed for computing stick radius and surface stresses of spheres with different elastic characteristics in normal contact.

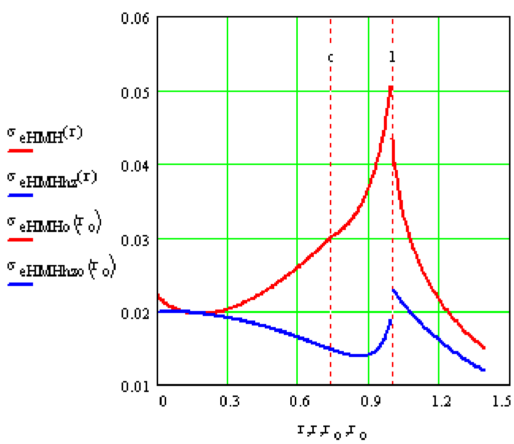

Fig. 3.c. Equivalent surface contact stresses: Hertzian case (blue) and partial slip case (red)

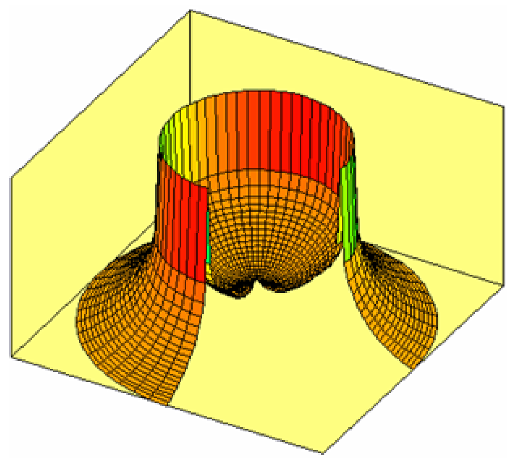

Fig. 3.d. 3D plot of equivalent stresses for the contact of finger skin-artificial finger skin

The friction coefficient influences the dimension of the stick region inside the contact area; at increasing friction coefficient, the stick region increases while the slip annulus decreases.

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