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ADHESION in ROLLING CONTACT of a PARTICLE

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The work is devoted to an analytical and numerical investigation of adhesive contacts under tangential loading and rolling (quasi-static contact). The "adhesion instabilities" at the contact boundary cause energy dissipation similarly to the elastic instability mechanism. This leads to different effective works of adhesion when the contact area expands and contracts. This effect is interpreted in terms of "friction" to the movement of the contact boundary. Different values for the effective work of adhesion when the contact area expands and contracts (adhesion hysteresis) are a direct consequence. Pure rolling is essentially a normal contact problem because the surfaces at the leading edge are approaching each other in the normal direction and on the rear edge they separate in normal direction, both without any tangential movement. Numerical simulations are carried out using the Fast-Fourier-Transform assisted Boundary Element Method for JKR(Johnson, Kendall and Roberts)-type adhesive contact. It is found that the rolling friction force contributed by the adhesion is the friction of contact boundary.

REFERENCES

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