

# UPON BEHAVIOUR SIMILARITY IN TANGENTIAL AND RADIAL FRETTING

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## ABSTRACT

Fretting is known as a wear process occurring in small amplitude cyclic motion of two solid contacting surfaces and it can affect the fatigue resistance of the material, inducing wear and cracking. The kinematics characteristics of movement yield to an interfacial micro-slip situation frequently encountered in industry due to machine vibrations. Both in tangential and radial fretting, the main cause of failure is surface degradation.

Under cyclic normal or tangential loading of a sphere on plane contact, common features were found. In both cases, tangential and radial fretting, the contact area is divided in two main zones: a central stick zone surrounded by an annular micro-slip region. In the centre, where the interface of the two bodies kept contact all the time, no damage was detected. The wear zone was located in the micro-slip zone.

For both cases Huber-Mises-Hencky equivalent stress is numerically computed, because it is considered to be responsible for surface failure.

Numerical results for this stress are illustrated in Figures 1 a) and b).

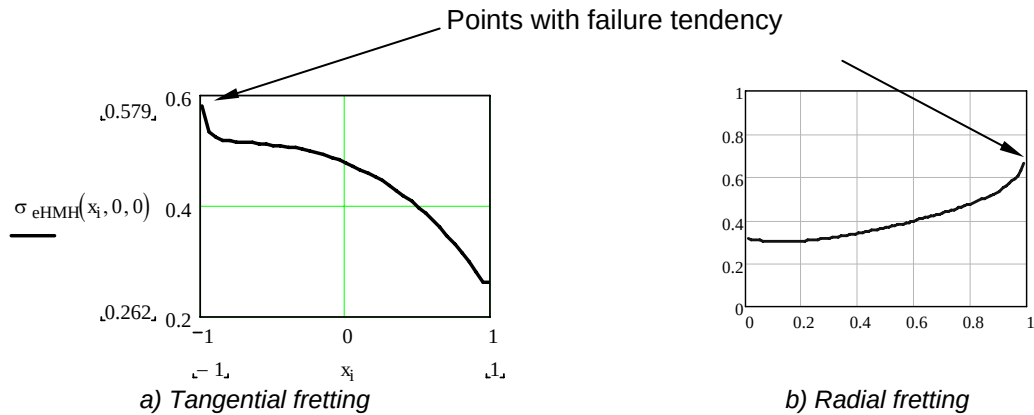


Figure 1. Huber-Mises-Hencky equivalent stress at the contact interface

The position of the first obtained microslip marks is in good agreement with positions of maximum Huber-Mises-Hencky stress.

## REFERENCES

- [1] Hills, D. A., Nowe I, D., Sakfield, A., *Mechanics of elastic contacts*, Butterworth-Heinemann Ltd; 1993.
- [2] Irimescu, L., Diaconescu, E.N., Berthier, Y., *Experimental investigations on interface phenomenon in a fretting contact*, RaDMI 2003, Serbia and Montenegro, 2003, pp.725-729.