

A FRACTURE MECHANICS APPROACH TO ROLLING OR SLIDING WEAR PROBLEMS

F.J. Gómez Jiménez and J. Gil Sevillano

CEIT (Centro de Estudios e Investigaciones Técnicas de Guipúzcoa) and Escuela Superior de Ingenieros Industriales de San Sebastián.

In many cases of rolling or sliding wear, the loss particles are thin lamellae. N.P. Suh and coworkers have rationalized this form of wear in the so-called "delamination theory of wear" assuming the formation of particles caused by the subsurface growing of fatigue cracks under the alternating stresses derived from the repeated passage of contact asperities. The problem of prediction of wear rates, particle sizes, etc. can be tackled as a particularly complex problem of Fracture Mechanics.

A research project about the wear of railway wheels, whose fatigue propagation characteristics have already thoroughly studied in a separate program, is in course at CEIT, and experimental work is complemented by a refinement of the development of the original delamination theory of wear. Stress intensity factors for subsurface cracks under different stress distributions and at different depths have been calculated both by an alternate method any by a finite element method. The calculation of those stress intensity factors were a necessary step for a quantitative application of the delamination theory of wear.