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Relation between internal friction and fatigue

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The background of internal friction in solids and their fatigue may be theoretically described by a migration of unspecified items which is caused by the action of mechanical stress gradients. From the two resulting formulae a relation between the fatigue and the background of internal friction has been deduced. With this relation the statistical distribution of the fatigue data can be explained to some extent. Data published by Ravilly in 1938 demonstrates the correctness of this theoretical result. For the case that temperature gradients are the reason for the migration of the unspecified items, a formula results which is similar to the above mentioned one for the fatigue. With the statistical analysis of the data for fatigue and the total internal friction it could be possible to answer the question which physical quantity is the cause of fatigue.

Recent Publications:

1. Gräfe W (2000) The effect of the diffusion of interstitial atoms on strength loss of steels. International journal of fatigue 22: 179-188.
2. Gräfe W (2005) Theoretical derivation and experimental examination of the Stromeyer relation for the analysis of fatigue data. Journal of testing and evaluation 33(3):160-167.
3. Gräfe W (2005) A new approach to the experimental determination of the surface energy of solid metals from materials testing data. Zeitschrift für physikalische Chemie 219:1625-1633.
4. Gräfe W (2006) The activation energy of static fatigue (creep of steel). Journal of testing and evaluation 34:134-148.
5. Gräfe W (2015) Time-dependent mechanical properties of solids: Relaxation of stress and density, strength (fatigue). Materials Science Foundations 78:1-180.

Biography

Wolfgang Grafe has completed his Degree in Physics at the Humboldt-Universitat in Berlin (GDR) in 1962. In the following years, he worked with semiconductors and semiconductor surfaces at the Akademie der Wissenschaften in Berlin. With the results of those investigations, he also received the degree Dr. rer. nat. (PhD) at the Humboldt-Universität in 1969. From 1971, he worked in the field of mechanical properties of mineral glasses. With the results of these investigations he has completed his Dr. sc. nat. degree at the Akademie der Wissenschaften in Berlin in 1984. He was employed in a Federal Administrative Authority in Berlin from 1991 till his retirement in 2001.

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