

**Zeitschrift:** IABSE reports of the working commissions = Rapports des commissions de travail AIPC = IVBH Berichte der Arbeitskommissionen

**Band:** 14 (1973)

**Artikel:** On studies of low cycle fatigue

**Autor:** Viest, Ivan M.

**DOI:** <https://doi.org/10.5169/seals-14482>

### **Nutzungsbedingungen**

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

### **Conditions d'utilisation**

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

### **Terms of use**

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

**Download PDF:** 20.08.2025

**ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>**

**On Studies of Low Cycle Fatigue**

Sur l'étude de fatigue à basse fréquence

Zu den Untersuchungen über niederzyklische Ermüdung

**Ivan M. VIEST**Bethlehem Steel Co.  
Bethlehem, Pa., USA

Several contributions presented during this conference dealt with the response of structural elements and systems to repeated excursions into the inelastic range. This is an area in which relatively little systematic research has been done in the field of civil engineering structures but has been under extensive investigation in other applications such as automobiles and off-road moving equipment.

Many parts in automobiles and particularly in off-road moving equipment fail because of a relatively small number of very severe overloads. In other words, they fail in low cycle fatigue. Extensive studies of such failures lead to the postulation of the hypothesis that such failures are related to the amount of absorbed energy and, furthermore, that the minimum energy required for failure corresponds to failure in one-half cycle, i.e., to failure under monotonic loading. Thus, for example, for a part stressed in direct tension the area under the monotonic stress-strain curve represents the lower limit of the total energy to failure under low cycle fatigue loading. As the maximum strain on any single excursion into the plastic range decreases, the number of cycles to failure increases and also the part is able to absorb an increasing amount of energy.

Extensive studies of low cycle fatigue have been conducted during the last decade by a research group at the University of Illinois lead by Professor Morrow\*. I believe the researchers working on the resistance of structures to earthquake loading will find results of those studies of considerable interest.

American Society for Testing Materials, STP 378, 1965, pp. 45-87.  
American Society for Testing Materials, Journal for Materials,  
March 1969, pp. 159-209.  
Norman Dowling, "Fatigue Life and Inelastic Strain Response Under  
Complex Histories For An Alloy Steel," American Society for  
Testing Materials, Journal of Testing and Evaluation, July 1973,  
pp. 271-287.

\*JoDean Morrow, "Cyclic Plastic Strain Energy and Fatigue of Metals,"

Leere Seite  
Blank page  
Page vide