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Zbigniew Marciniak, Dariusz Rozumek

PII: S0142-1123(16)30095-0
DOI: http://dx.doi.org/10.1016/j.ijfatigue.2016.05.008
Reference: JIJF 3957

To appear in: *International Journal of Fatigue*

Received Date: 14 December 2015
Revised Date: 6 May 2016
Accepted Date: 11 May 2016

Please cite this article as: Marciniak, Z., Rozumek, D., Professor Ewald Macha's contribution to the development of methods for multiaxial fatigue life estimation, *International Journal of Fatigue* (2016), doi: http://dx.doi.org/10.1016/j.ijfatigue.2016.05.008

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Zbigniew Marciniak [*], **Dariusz Rozumek**

Opole University of Technology, Department of Mechanics and Machine Design, Mikołajczyka 5, 45-271 Opole, Poland

Abstract

Multiaxial fatigue of machine elements and construction is still a remarkable problem in everyday life. Many accidents were consequences of inaccurate estimation of stresses and fatigue life. Despite many years of work and research on the subject, fatigue life estimation is still very important to be examined. Professor Ewald Macha was a researcher involved in the development issues of fatigue life estimation and, in particular, was interested in multiaxial fatigue failure criteria based on the critical plane approach, where he formulated the stress, strain and strain energy density criteria. Particularly noteworthy are the methods for determination of the critical plane position. In this field, Prof. Macha proposed a weight function method, and then a variance method. These methods have been verified experimentally. Professor Macha also proposed a method for determination of the energy fatigue characteristics, especially for cyclically unstable materials. This paper describes the scientific achievements of Prof. Macha.

Keywords: energy, fatigue crack growth, multiaxial fatigue failure criteria, variance method, weight function method

Nomenclature

a - coefficient allowing to include amplitudes below the fatigue limit in the process of fatigue damage accumulation

[*] Corresponding author. Tel.: +48-77-449-8422; fax: +48-77-4006-343.