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Analysis of bone microdamage with X-ray microtomography towards fatigue fracture prevention

given by

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We worked in the consolidation of studies performed by us concerning microdamage developments in bones with use of conventional basic fuchsin staining, on the generation and growth of microfractures which provoke the fracture of bones by fatigue. The mentioned conventional staining technique has the disadvantage of being invasive, destructive, two-dimensional (2-D), and tedious. The aim of our current work was the use of a world-unique patented computed tomography device – TORATOM. While previous studies did not detect microcracks by micro-CT prior staining, our study allowed detecting individual microcracks without the use of contrast agents. It is important to mention that microtomography allowed to observe individual microcracks for the first time, and their isolation within a volume enabled to identify their geometrical structure. Accordingly, quantification of microcracks and statistical analysis with the use of Weibull distribution was accomplished, according to a novel concept named characteristic volume. The importance of our findings aims to help define better predictive models to understand and prevent fatigue fractures due to stress and fragility related to osteoporosis, which will be useful in developing new clinical approaches to the problem of osteoporosis.

The lecture will be held on Monday, April 15, 2019 at 10:00 AM in the building of the Institute of Theoretical and Applied Mechanics in TELČ, Batelovská 485, 588 56 Telč.

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