Dear Editor,

Attached, we submit our manuscript entitled: „Study of fracture processes in sandstone subjected to four-point bending by means of 4D X-ray computed micro-tomography“, for consideration of its publication in the Acta IMEKO journal.

The paper presents actual findings in long term collaborations of Institute of Geonics and Institute of Theoretical and Applied Mechanics of Czech Academy of Sciences. On last IMEKO GC the TC15 was updated, Dr. Leona Vavro became a member and Assoc. Prof. Daniel Kytýř a chair of TC15. This is our first joint publication after this update and we want to take the opportunity to present our work primarily to the IMEKO community.

It is a well-known fact that the failure process of rocks and similar quasi-brittle materials is the result of complex mechanisms, including microcrack initiation, propagation, and interactions with each other, resulting in crack coalescence and final material rupture. To the present, many techniques such as scanning electron microscopy or acoustic emission detection have been adopted to study the progression of the failure process of rocks. In the case of these experimental approaches, basic data about crack propagation can be obtained, but the spatial information about deformation processes and fracture development throughout the tested sample volume remains unknown. For this reason, a wide range of uses is opening up for high-resolution X-ray computed micro-tomography (XCT). To obtain all the significant information about the deformation behaviour and fracture characteristics of the studied rocks, completely newly designed loading device with a four-point bending setup, vertically oriented scanned samples and suitable for the integration into existing tomographic setups was used. Thanks to this unique design of the measurement procedure, coupled with the high stiffness of the load-bearing frame, the loading process can be interrupted at any moment. The series of XCT measurements carried out during the loading process of two types of sandstones enabled the identification, 3D visualization, and analysis of crack propagation in the investigated specimen together with the crack shape.

The chosen experiment design is a completely original approach in observation crack propagation in quasi-brittle materials. That is why, we believe that the submitted manuscript will be interesting not only for the readers from the rock mechanics community.

We warrant that the manuscript represents original work that is not being considered for publication, in whole or in part, in another journal, book, conference proceedings, or internet. We also confirm that all of the authors have contributed substantially to the manuscript and approved the final submission. All co-authors agree with the manuscript submission in the Acta IMEKO journal. If accepted, it will not be published elsewhere in the same form, neither English nor in any other language. The text of the article was reviewed by a native speaker via Proof-Reading-Service.com.

None of the authors has competing interest or financial conflicts of interest concerning the results presented in this work. Moreover, none of the authors has any financial or personal relationship with other people or organizations that would inappropriately bias the work presented in this contribution.

We kindly ask for the evaluation of the manuscript in a review process.

Thank you very much.

Best regards,

Martin Vavro

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