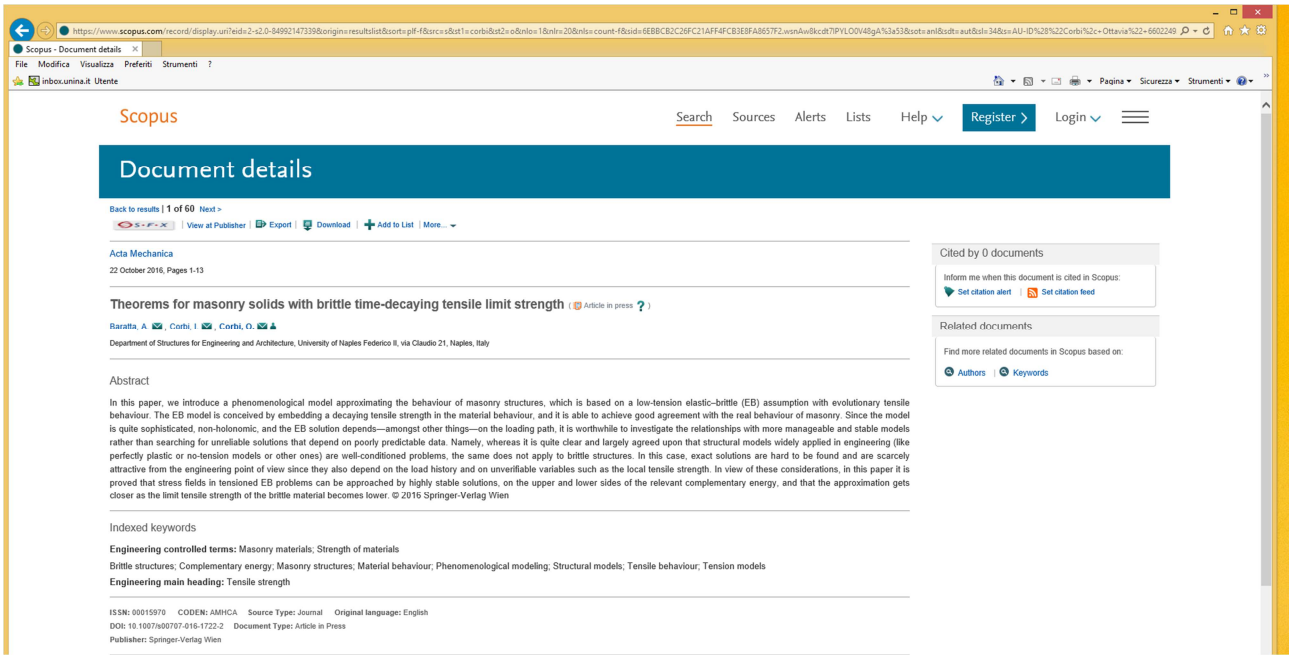
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Theorems for masonry solids with brittle time-decaying tensile limit strength
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Abstract
In this paper, we introduce a phenomenological model approximating the behaviour of masonry structures, which is based on a low-tension elastic–brittle (EB) assumption with evolutionary tensile behaviour. The EB model is conceived by embedding a decaying tensile strength in the material behaviour, and it is able to achieve good agreement with the real behaviour of masonry. Since the model is quite sophisticated, non-holonomic, and the EB solution depends—amongst other things—on the loading path, it is worthwhile to investigate the relationships with more manageable and stable models rather than searching for unreliable solutions that depend on poorly predictable data. Namely, whereas it is quite clear and largely agreed upon that structural models widely applied in engineering (like perfectly plastic or no-tension models or other ones) are well-conditioned problems, the same does not apply to brittle structures. In this case, exact solutions are hard to be found and are scarcely attractive from the engineering point of view since they also depend on the load history and on unverifiable variables such as the local tensile strength. In view of these considerations, in this paper it is proved that stress fields in tensioned EB problems can be approached by highly stable solutions, on the upper and lower sides of the relevant complementary energy, and that the approximation gets closer as the limit tensile strength of the brittle material becomes lower. © 2016 Springer-Verlag Wien
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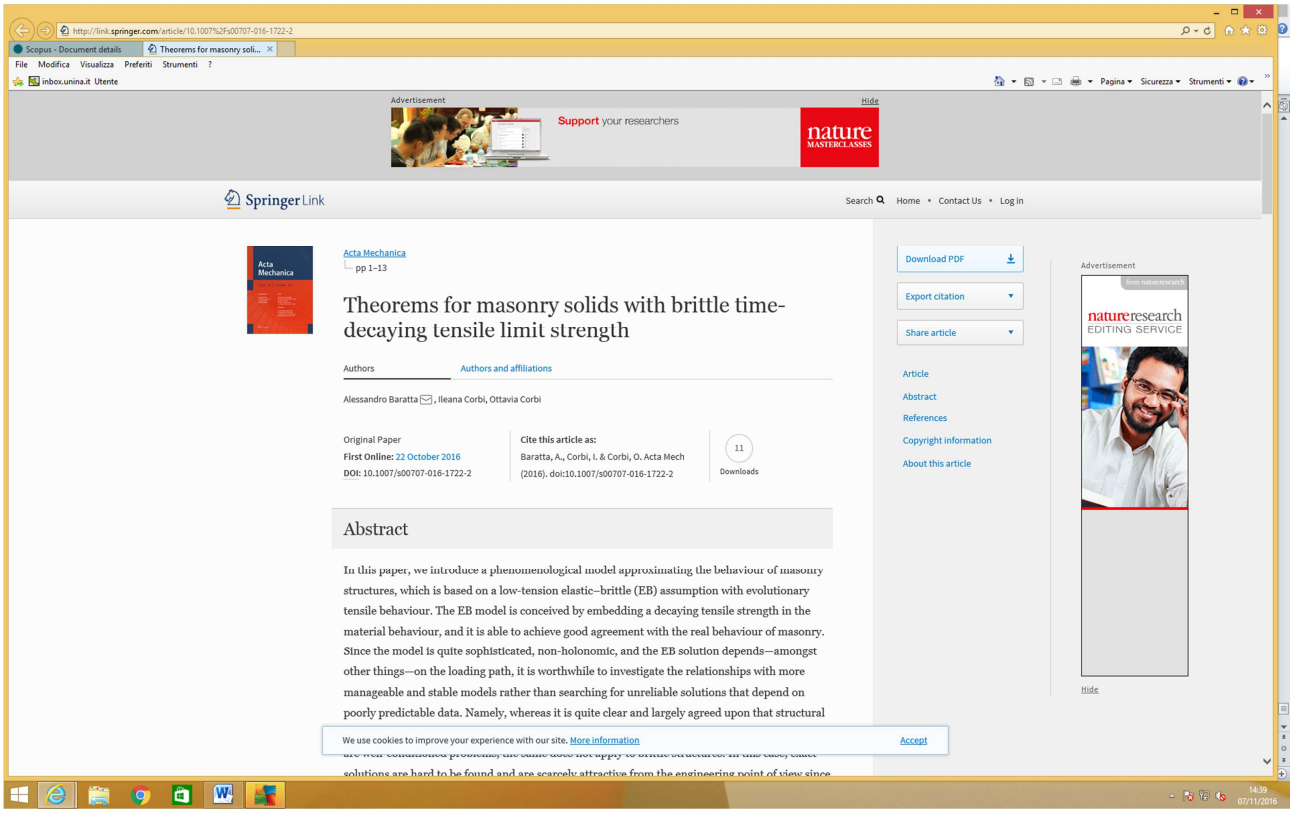
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