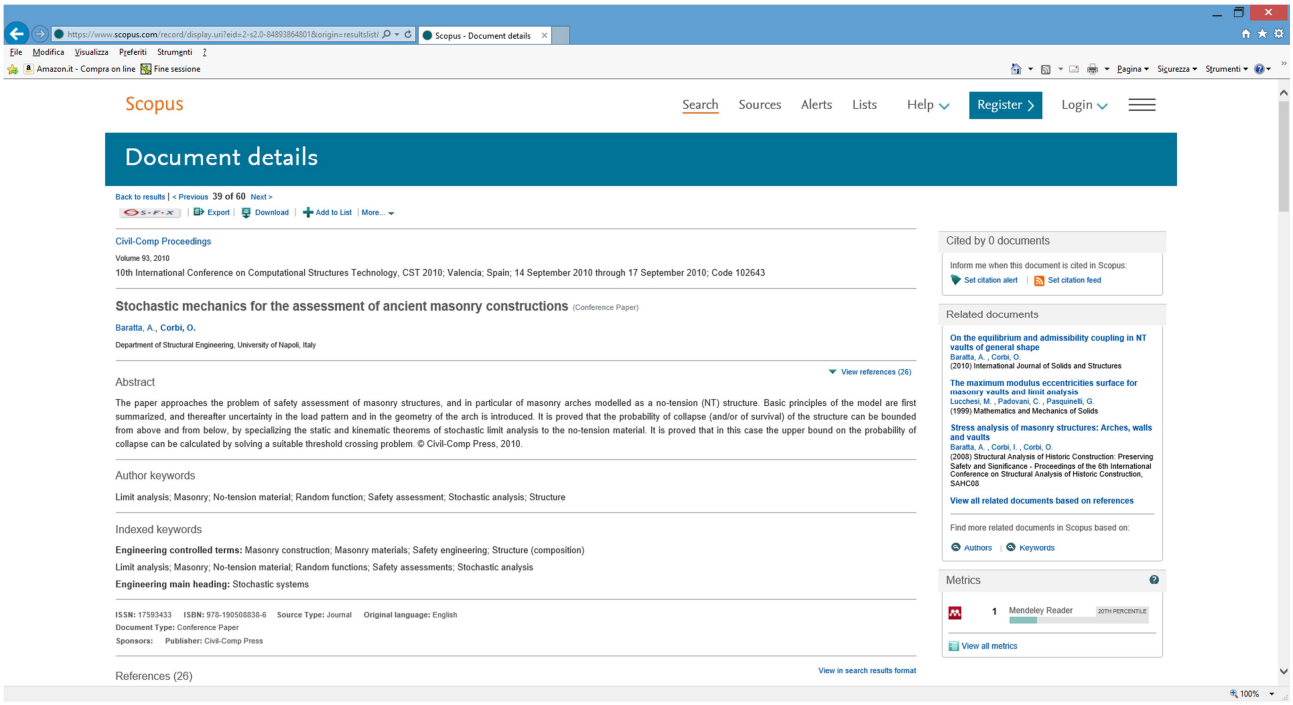
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Stochastic mechanics for the assessment of ancient masonry constructions (Conference Paper)
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Abstract
The paper approaches the problem of safety assessment of masonry structures, and in particular of masonry arches modelled as a no-tension (NT) structure. Basic principles of the model are first summarized, and thereafter uncertainty in the load pattern and in the geometry of the arch is introduced. It is proved that the probability of collapse (and/or of survival) of the structure can be bounded from above and from below, by specializing the static and kinematic theorems of stochastic limit analysis to the no-tension material. It is proved that in this case the upper bound on the probability of collapse can be calculated by solving a suitable threshold crossing problem. © Civil-Comp Press, 2010.
Author keywords
Limit analysis; Masonry; No-tension material; Random function; Safety assessment; Stochastic analysis; Structure
Indexed keywords
Engineering controlled terms: Masonry construction; Masonry materials; Safety engineering; Structure (composition)
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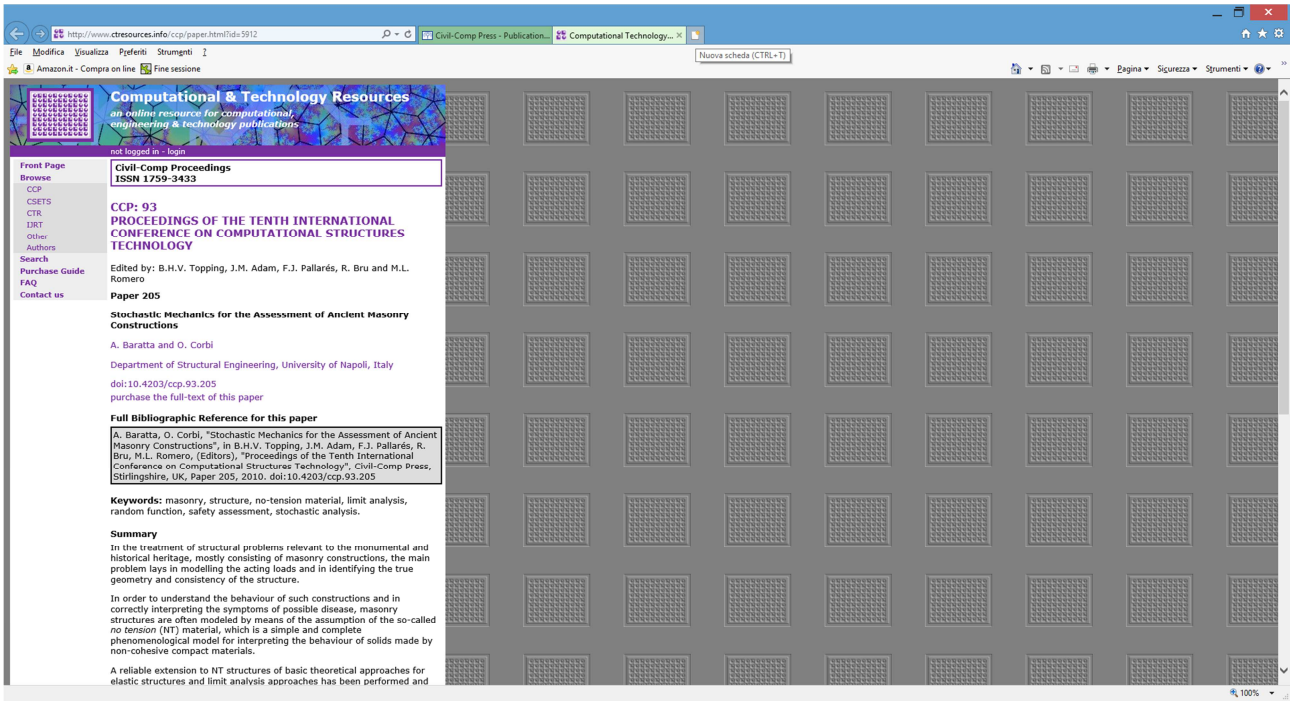
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Keywords: masonry, structure, no-tension material, limit analysis, random function, safety assessment, stochastic analysis.
Summary
In the treatment of structural problems relevant to the monumental and historical heritage, mostly consisting of masonry constructions, the main problem lays in modelling the acting loads and in identifying the true geometry and consistency of the structure.
In order to understand the behaviour of such constructions and in correctly interpreting the symptoms of possible disease, masonry structures are often modeled by means of the assumption of the so-called no tension (NT) material, which is a simple and complete phenomenological model for interpreting the behaviour of solids made by non-cohesive compact materials.
A reliable extension to NT structures of basic theoretical approaches for elastic structures and limit analysis approaches has been performed and