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### On limit analysis of masonry arches with brittle tensile strength (Conference Paper)

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**Abstract**  
This paper focuses on a special mechanical model for masonry bodies, which is referred to as the elastic brittle (BR) model. Actually the BR model is evolutionary since the non-null tensile stress yield value is assumed to decay during time and converge towards the no-tension behaviour; this involves the need of investigating the relationships of the solution with other solutions related to more well known models, which requires for the BR model the development of proper formulations. The paper starts from the consideration that, since the failure in tension is brittle, the theorems of limit analysis (LA) are not justified. Thereafter an approach to the problem investigated is to consider how far the collapse behaviour of BR structures can be analysed with the usual tools of LA and to formalize some bounding theorems for their ultimate load-carrying capacity. The proposed approach is applied to masonry arches modelled assuming the BR hypothesis, which exhibits a uni-axial stress state, but it may be easily generalized to different typologies. © Civil-Comp Press, 2013.

**Author keywords**  
Elastic-brittle model, Energetic formulation, Energy bounds, Masonry materials, No-tension model, Theoretical approaches

**Indexed keywords**  
**Engineering controlled terms:** Computer aided engineering; Environmental engineering; Masonry construction; Masonry materials; Tensile strength  
**Energetic formulations; Energy bounds; Limit analysis; Masonry arches; Mechanical model; Stress state; Theoretical approach; Ultimate load-carrying capacity**  
**Engineering main heading:** Masonry bridges

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**Paper 75**  
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**Keywords:** masonry materials, no-tension model, elastic-brittle model, energetic formulation, theoretical approaches, energy bounds.

**Summary**  
This paper focuses on a special mechanical model for masonry bodies, which is referred to as the elastic brittle (BR) model. Actually the BR model is evolutionary since the non-null tensile stress yield value is assumed to decay during time and converge towards the no-tension behaviour; this involves the need of investigating the relationships of the solution with other solutions related to more well known models, which requires for the BR model the development of proper formulations. The paper starts from the consideration that, since the failure in tension is brittle, the theorems of limit analysis (LA) are not justified. Thereafter an approach to the problem investigated is to consider how far the collapse behaviour of BR structures can be analysed with the usual tools of LA and to formalize some bounding theorems for their ultimate load-carrying capacity. The proposed approach is applied to masonry arches modelled assuming the BR hypothesis, which exhibits a uni-axial stress state, but it