

# Influence of the loading rate on the measurement of the fracture energy of a high strength concrete

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## Abstract

This paper presents very recent results of an experimental program aimed at disclosing the loading rate effect on the fracture behavior of a high strength concrete. Twenty notched beams were tested to measure the specific work of fracture [1]. The tests were performed using a hydraulic servo-controlled testing machine at five loading rates (loading point displacement rate), from  $1.74 \times 10^{-5}$  mm/s to 17.4 mm/s. The experimental results show that the work of fracture and the nominal failure stress increase with the loading rate. The results are analyzed by means of a theoretical cohesive model that includes viscous term [2], which accounts for time dependent phenomena related to the movement of water through the pores network within the cement bulk [3]. The model provides with expressions for the nominal stress and the work of fracture which fits very well with the experimental data. Moreover, the methodology followed in this paper allows the calculation of the specific fracture energy of the material under strictly static loading conditions.

**Key words:** loading rates, fracture energy, high strength concrete

**Areas:** Aplicaciones y Casos Prácticos en Ingeniería

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