FRACTURE MECHANICS

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KEYWORDS: stress intensity factors, piezoelectric materials

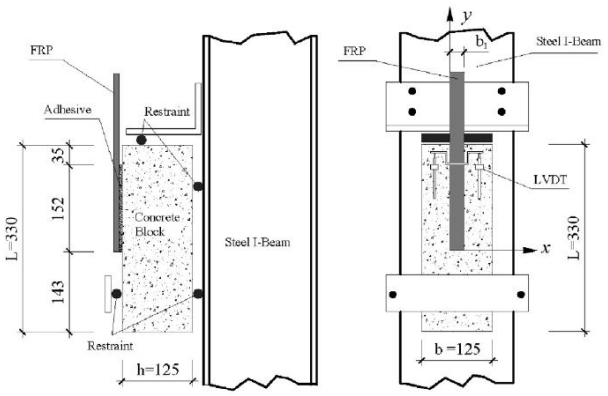

Fig.1 Specimen dimensions and loading arrangement

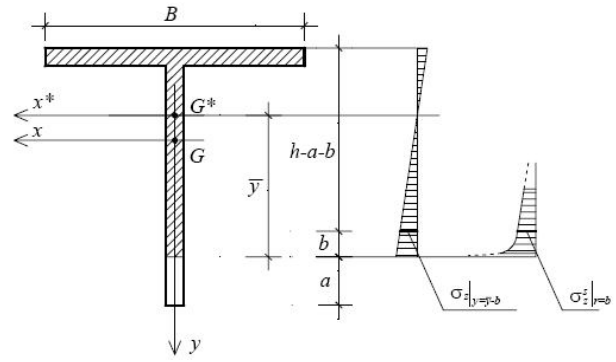

Fig.2 Edge-cracked T beams

This research line encompasses the development of numerical simulations for the analysis of cracked structural components. In particular, the research focuses on advanced ad-hoc developed formulations for modelling the behaviour of:

- cracked piezoelectric media;
- stress intensity factors;
- investigation on the behaviour of cracked beams within the stability framework. In particular, beams with one or more non-interacting edge-cracks are considered. The cracks are modelled as massless rotational springs. The spring constant is determined on the basis of the energy released due to the crack and by means of Castigliano's theorem. This method has been employed to compute exact critical loads for a single cracked column with various end conditions and crack locations. Enforcing displacements, slope, moment continuity and additional conditions related to the presence of the cracks, analytical expressions for the characteristic equations are derived for different crack-to-beam depth ratios, geometry and location of the cracks.
- a new fatigue sensor called smart stress-memory patch, which can estimate the cyclic number, the stress amplitude and the maximum stress from the measurement of crack length and acoustic emission (AE), is proposed to evaluate the fatigue damage of such infrastructure as bridges and ships.

Links

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MAIN PUBLICATIONS

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RESEARCH PROJECTS

- SMooHS - Smart Monitoring of Historical Structures, UniBO, European Research project ENV.2007.3.2.1.1.

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