

A Study On The Influence Of The Horizontal Cracking On The Modal Parameters Of Cabril Dam. Experimental And Numerical Results

Sérgio OLIVEIRA, André ALEGRE

Cabril dam is a 132 m high double curvature arch dam, in operation since 1954 in Portugal. During the first filling of the reservoir, horizontal cracks appeared in the upper part of the structure, on the downstream face. In 2008, the dam was instrumented with a pioneer continuous dynamic vibrations monitoring system, designed for seismic behavior monitoring and structural health monitoring. This paper presents a study on the modal parameters of Cabril dam, considering the influence of the horizontal cracking, based on modal identification outputs and finite element modeling results. Namely, the natural frequencies and modal configurations of the main vibration modes, estimated from vibrations measured under ambient/operational excitation, are analyzed and then compared with results obtained in computational modal analysis, using a finite element model of the dam-reservoir-foundation system. The presented results show that it is possible to identify a vibration mode that is clearly influenced by the movements of the dam blocks above the horizontal cracking; furthermore, the performed comparative study enabled the calibration of the finite element model, particularly in what concerns the incorporation of the horizontal cracking in the dam model.