

## **ROCK MASS FOUNDATION SEISMIC TOMOGRAPHY AND ITS CONTRIBUTION FOR THE MODELLING OF BAIXO SABOR DAM'S STRUCTURAL BEHAVIOUR**

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### **ABSTRACT**

Crosshole seismic tomography method may be used for assessing the mechanical properties of dam's rock mass foundations. With this method the whole rock mass foundation along dam's reference profile was covered providing relevant data about its geomechanical characteristics as the location of discontinuities and weak zones.

This paper presents the crosshole seismic tomography characterization of Baixo Sabor dam's rock mass foundation in terms of P-wave seismic velocity. There is also presented its contribution to the finite element model that supported the analysis and interpretation of dam's structural behaviour during the first filling of the reservoir that took place from December 2013 to April 2016 and the subsequent operation period until late January 2017.

Geological-geotechnical characterization of Baixo Sabor dam and seismic tomographic profile by its reference line are presented, allowing to verify their good general fit, namely the fair (GZ2) to good (GZ1) quality granite to which correspond relative higher seismic velocity zones. Moreover fractured and weathered rock (GZ3) is associated with relative low seismic velocity zones. This seismic velocity zoning was used as one of the tools to mechanically characterize the dam's foundation, as a complementary tool to calibrate the mechanical parameters for the modelling of the dam's structural behaviour, namely for the foundation deformability action. The characterization of the materials' properties (concrete and rock mass foundation) and of the actions and responses during the first filling of the reservoir, as well as the structural model used to simulate the structural behaviour, are presented. This model included a 3D representation of the dam and its rock mass foundation and it was analysed by the finite element method, considering the actions time evolution, the foundation deformability and the concrete viscoelastic behaviour. A good agreement between the monitoring results and those obtained through the mathematical modelling was achieved, which confirmed the good performance of the dam and the modelling adequacy during this important stage.

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