



## **Hydrostatic-Season-Time model for Montedoglio earth dam (Italy) rapid drawdown**

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Understanding the long-term behaviour of an earth dam is essential to interpret the measured data, in order to be able to distinguish the deformations caused by irreversible events and factors as the ageing of the dam in order to ensure its structural safety. Moreover, detecting alarming behaviour on time is difficult because the effects of the involved processes are correlated. In order to minimize the uncertainty in data interpretation, a continuous monitoring and a numerical modelling of the pressures in dam body, is required. The polynomial Hydrostatic-Season-Time (HST) model is applied in order to individuate the correlation between the variation of the pore pressures measured by the piezometers and by manometers and the variation of the water level in the reservoir. The HST model allows to evaluate the long term behaviour of earth dam considering three main components: effects of the reservoir level, seasonal effects, the time drift and the rainfall. This last term must be taken into account when analysing hydraulic related measurements. In the night between 29th and 30th December 2010 during the filling test of the reservoir an incident occurred to the main body of the Montedoglio earth dam, located in Sansepolcro, Tuscany (Italy). Using the HST Model, this study aims to assess the behaviour of the dam core during the rapid drawdown that follows the event. The applicability of the model is verified with a finite elements method passing through different steps. At first step a simplified levee scheme and a simplified hydrograph of the reservoir level are used to determine the flow line with the solver. The results are compared with the ones estimated through the Pavlovsky method. Then the real model of the levee and the real hydrograph of the reservoir level are utilized to find a second flow line. This line is compared with the real pore pressure measurements to obtain the validation of the solver model and then with the HST predicted values. The obtained results confirm the goodness of the adopted model for the involved phenomena.