

## Simulation of Flow through Dam Foundation by FEM and ANN Methods Case Study: Shahid Abbaspour Dam

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**Abstract :** In this study, a finite element (Seep3D model) and an artificial neural network (ANN) model were developed to simulate flow through dam foundation. Seep3D model is capable of simulating three-dimensional flow through a heterogeneous and anisotropic, saturated and unsaturated porous media. Flow through the Shahid Abbaspour dam foundation has been used as a case study. The FEM with 24960 triangular elements and 28707 nodes applied to model flow through foundation of this dam. The FEM being made denser in the neighborhood of the curtain screen. The ANN model developed for Shahid Abbaspour dam is a feedforward four layer network employing the sigmoid function as an activator and the back-propagation algorithm for the network learning. The water level elevations of the upstream and downstream of the dam have been used as input variables and the piezometric heads as the target outputs in the ANN model. The two models are calibrated and verified using the Shahid Abbaspour's dam piezometric data. Results of the models were compared with those measured by the piezometers which are in good agreement. The model results also revealed that the ANN model performed as good as and in some cases better than the FEM.

**Keywords :** seepage, dam foundation, finite element method, neural network, seep 3D model

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