Inverse Analysis of Coupled Hydro-Mechanical Problem in Dynamically Excited Dams

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Abstract

Dams play a major role in the development and sustenance of communities, economies and civilizations. Apart from being exposed to a variety of dynamic forces (ambient and induced), many dams today have been in operation beyond their design life cycle and thus uncertainty and deterioration in the material properties would be expected. In order to reduce the risk of failure of these structure, a strict and frequent monitoring of the structure is required. However as a result of the physical scale of most dams, this is cumbersome and in many cases expensive. In an attempt to gain insight into the physical properties (such as stiffness and density distribution, permeability, etc) which are crucial to the effective operation of these dams an inverse analysis is carried out on the coupled hydro-mechanical finite element model. The parameter identification is done using experimental data obtained from recorded response resulting from induced vibrations on the dams' crest. As with most engineering problems, we are faced with an ill-posed problem. Thus we intend to propose an efficient algorithm for the inverse problem and also ascertain the quality of the calculated parameters by making a comparison between the simulated and recorded dam response.