

Effect of temperature and creep on roller compacted concrete dam during the construction stages

ABSTRACT

Development of temperature rise in massive concrete structure such as a roller compacted concrete dam is attributed to hydration of concrete and environmental boundary conditions. These thermal changes in the material affect the elastic, creep properties of the material, and in turn, the stress fields within the structure. Therefore, the effects of temperature on the properties of RCC materials (elastic, creep) has to be taken into account in order to determine the risk of the thermally induced cracking in these dams. In the present work an attempt has been made to consider the effect of temperature on the elastic and creep properties. A viscoelastic model, including ageing effects and thermal dependent properties is adopted for the concrete. Safety against a crack occurrence over the time is determined using crack criterion factor. The result has shown that, the increase of the elastic modulus has been accelerated due to the high temperature of hydration at the initial stage, and consequently stresses are increased. The maximum principle stresses increased by 40% in the initial stage.

Keyword: FEM; Roller compacted concrete dam; Thermal stress; Creep; Crack criterion factor