Numerical Modelling and Soil-structure Interaction Analysis of Rigid Ballast-less and Flexible Ballast-based High-speed Rail Track-embankments Using Software

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Abstract : With an increase in travel demand and a reduction in travel time, high-speed rail (HSR) has been introduced in India. Simplified 3-D finite element modelling is necessary to predict the stability and deformation characteristics of railway embankments and soil structure interaction behaviour under high-speed design requirements for Indian soil conditions. The objective of this study is to analyse the rigid ballast-less and flexible ballast-based high speed rail track embankments for various critical conditions subjected to them, viz. static condition, moving train condition, sudden brake application, and derailment case, using software. The input parameters for the analysis are soil type, thickness of the relevant strata, unit weight, Young's modulus, Poisson's ratio, undrained cohesion, friction angle, dilatancy angle, modulus of subgrade reaction, design speed, and other anticipated, relevant data. Eurocode 1, IRS-004(D), IS 1343, IRS specifications, California high-speed rail technical specifications, and the NHSRCL feasibility report will be followed in this study.

Keywords : soil structure interaction, high speed rail, numerical modelling, PLAXIS3D
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