SEISMIC BEHAVIOUR OF NOVEL INTEGRAL ABUTMENT BRIDGES

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Abstract:
Integral abutment bridges (IABs) are becoming rather common due to the durability problems of bearings and expansion joints. Monolithic connections between the deck and sub-structure allow, on one side, to increase the structure redundancy and reduce the maintenance costs. However, from the other side, soil-structure effects are also introduced due to the interactions between the abutment and the backfill and between the pile and soil induced by thermal variations, long-term effects (creep and shrinkage) and dynamic loads, such as earthquakes. Several authors have investigated the soil-structure interaction for IABs both theoretically and experimentally, but there is still a lack of common line guidelines and codes. After a literature review of the main studies regarding the seismic response of IABs, this paper introduces some recent contributions given by investigators in this field. In particular, the following topics are discussed: (a) an experimental study on an innovative deck to pier/abutment joint; (b) the possibility of using prestressed concrete or ultra-high performance piles in IABs; (c) a pile isolation technique based on a pre-hole filled with damping materials; and (d) a research project supported by European Union inside the Horizon 2020 SERA project on the seismic behaviour of novel integral abutment bridges. The paper clearly demonstrates the potential applications of the proposed technologies for IABs built in seismic zones.

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