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Finite Element Analysis of Structural Concrete Insolated Panels Subjected to Dynamic Loadings

The growing human population around the globe imposes the need for highly sustainable and least energy intensive built environment. In the conventional building systems, enormous amount of energy is consumed for heating, ventilation and cooling applications to provide thermally comfortable environment for the occupants. Thermal insulations or energy storage materials are usually applied to reduce the energy consumption of the building. However, these materials not only increase the construction cost but also enhance the dead weight of the structures. In this regard, structural concrete insolated panels (SCIP) may provide efficient thermal performance while ensuring structural stability and economy. SCIP is a relatively new technology in which insulation material is sandwiched between layers of concrete. These panels may be produced onsite or prefabricated and transported to the site for rapid construction. In the present research, the performance of a typical building incorporating SCIP has been evaluated by using three-dimensional finite element analysis. Further, the response was also compared with the conventional building systems in terms of safety and serviceability. The results show that the SCIP-construction is economical, less time consuming and capable of withstanding higher dynamic or earthquake loadings as compared to the conventional building systems.

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