

Failure Probability Assessment of Concrete Spherical Domes Subjected to Ventilation Controlled Fires Using BIM Tools

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Abstract : Fires are considered a common hazardous action that any building may face. Most buildings' structural elements are designed, taking into consideration precautions for fire safety, using deterministic design approaches. Public and highly important buildings are commonly designed considering standard fire rating and, in many cases, contain large compartments with central domes. Real fire scenarios are not commonly brought into action in structural design of buildings because of complexities in both scenarios and analysis tools. This paper presents a modern approach towards analysis of spherical domes in real fire condition via implementation of building information modelling, and adopting a probabilistic approach. BIM has been implemented to bridge the gap between various software packages enabling them to function interactively to model both real fire and corresponding structural response. Ventilation controlled fires scenarios have been modeled using both "Revit" and "Pyrosim". Monte Carlo simulation has been adopted to engage the probabilistic analysis approach in dealing with various parameters. Conclusions regarding failure probability and fire endurance, in addition to the effects of various parameters, have been extracted.

Keywords : concrete, spherical domes, ventilation controlled fires, BIM, monte carlo simulation, pyrosim, revit

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