

Thesis Title :

Structural behaviour of the doubly curved shell structure using Mud-Concrete (MC)

Abstract :

Many new construction technologies and materials were introduced and developed throughout the history of construction industry. However, affordability and implementation of these materials and technologies in the developing countries is a challenge. Thus, as a sustainable solution, utilization of earthen materials, and allied construction practices, are ideal for developing countries due to its affordability (Sore et al., 2018) and low embodied energy (Reddy et al., 2014). In modern constructions, conventional materials such as concrete and steel are more popular than the earth-based materials. Although there are several earth based modern construction techniques for walling, such as rammed earth (Walker et al., 2005), mud-concrete (Arooz and Halwatura, 2017) are present in Sri Lanka, no reliable technique is developed or adopted as a slab system. Most of the recent earthen constructions are either single storied or use concrete as their slab system. Thus, the earthen slab system would be a huge step towards a structure fully made of earthen materials. Researchers have developed thin tile vault slab systems using barrel vault shell structures. However, there are several challenges arise when thin tiles used for the construction such as difficulties during manufacturing and handling process of thin tiles, requirement of binding agents, time consumption, etc. Thus, the attempt here is to identify the structural behaviour of the doubly curve shell structure using Mud-Concrete and go for fully earthen multi-storey constructions while fulfilling the sustainable demands in the construction industry.