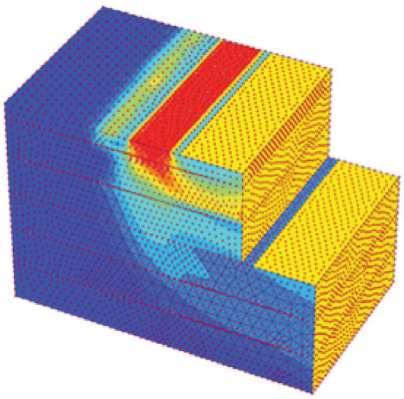
Multi-tiered fly ash wall reinforced with waste plastic bottle geocell

(a) Waste Plastic Bottle Geocell Mattress (b) Wall Facing (c) 2-Tier Laboratory wall model



Finite Element Model of 2-Tiered Wall

A reinforced wall made by constructing offset at different elevation is called a multi-tiered wall. The disposal of waste such as plastic water bottles and fly ash is a major environmental concern. The study aims at utilizing fly ash as backfill and waste plastic bottle geocell as reinforcement for the wall in a tiered configuration. Laboratory model study and finite element analysis of tiered wall models have been carried out and compared with the single wall. The tiered wall was modelled and the offset distance was varied as 0, 0.2L, 0.4L and 0.6L, where L is defined as the height of lower tier. Unreinforced and reinforced models were tested to determine critical offset distance, the effect of offset distance and reinforcement on different parameters governing the design of the tiered wall. It was found that inclusion of reinforcement increases the critical offset distance reduces horizontal wall facia displacement and increases stability of wall. The critical offset distance was found to be 0.4 times the height of lower tier for the unreinforced model and 0.6 times the height of lower tier for the reinforced model. The inclusion of reinforcement also reduces the horizontal wall facia displacement. Decrease in wall facia displacement was also observed with increase in the offset distance. Increase in the number of tiers increases the factor of safety making the structure more stable.

Prof. J. N. Mandal, Department of Civil Engineering, cejnm@civil.iitb.ac.in