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Behaviour of Simply Supported Slip-Formed Load Bearing Wall Panels under In-plane Compressive Loading

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In mid 80's A.N.S. Kulasinghe introduced a low-cost load-bearing wall panel made of a special composite material, using a special construction technique called slip-formed method. This special composite material consists of cement, crusher dust and coir. The load bearing wall panels are constructed together with pre-stressed pre-cast columns, in-situ reinforced concrete plinth beam and a tie beam. Even though this method is a proven low cost alternative for conventional reinforced concrete framed buildings, its application has so far been limited to about 4 storeyed buildings due to non-availability of technical data.

As the basic unit of construction of this type of structures is the slip-formed load bearing "wall panel", understanding of the behaviour of this unit subjected to different types of loadings is fundamental to the understanding of the whole structure. Therefore, in this study, the structural behaviour of the composite wall panels was studied under in-plane compressive load, with support condition similar to present construction practice.

According to the results, it was observed that the stress at first crack in framed wall panels with simple support at base varies from 2.41 MPa to 2.96 MPa. It was also observed that, in those wall panels, the first crack appears when 70%-82% of the cube strength was attained. Furthermore, it was seen that even with simple support condition at base (i.e. the wall is constructed without the continuous rubble masonry strip foundation but with shallow plinth and tie beams), the panels posses relatively higher strength due to the combined frame and deep beam action. In addition, the introduction of the shallow reinforced concrete plinth beam at the bottom of the wall provides resistance against tension and also improves the flexural resistance of the wall panel. Further, it was observed that this type of walls exhibit sufficient ductility, ensuring a sufficient warning before failure. This indicates that with some more experimental and theoretical investigations, the panels with simple support at the base can be used as transfer girders at the ground floor in medium-rise buildings considering the conveniences and economic efficiencies.

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