

Development of interlocking mechanism for shear transfer in composite floor

ABSTRACT

Semi-pre-cast floor slab (called half slab in Malaysia) has been used widely in different parts of the world. It consists of a reinforced concrete pre-cast layer that acts initially as a formwork connected in situ with another concrete layer using shear connectors. Steel reinforcement (shear link, studs and/or steel truss) is commonly used to transfer the horizontal shear between the two composite layers. Longitudinal shear failure is the most common type of failure in the composite floor slab. This paper proposes a new system to transfer the horizontal shear between the interfaces of the pre-cast and cast in situ layers of concrete slab. The proposed system implements an interlocking concept and does not require any shear reinforcement. The composite floor slab used to illustrate the interlocking concept consists of a pre-cast inverted ferrocement layer interconnected with the cast in situ brickó mortar layer. The effectiveness of the interlocking mechanism in transferring the stresses developed due to the applied load is investigated. Eleven composite slab specimens having different shear connectors between the two layers were cast and tested under pure shear loading (push-off test). In the tested specimens, different interlocking mechanisms, continuous truss shear connectors and no connectivity between the two layers were used to connect the layers of slabs. The results indicate that the interlocking mechanism proposed is, as effective as, the steel trusses in resisting shear stresses and can be used to replace the steel trusses, which in turn will reduce the cost of the composite slab.

Keyword: Composite slab; Ferrocement; Interlocking system; Push-off test; Steel truss shear connectors; Masonry