

Effective Width of Reinforced Concrete U-Shaped Walls Due to Shear Lag Effects

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Abstract : The inherent assumption in the elementary theory of bending that plane sections remain plane is commonly used in the design of reinforced concrete members. However, in reality, a shear flow would develop in non-rectangular sections, where the longitudinal strains in between the web and flanges of the element would lag behind those at the boundary ends. This phenomenon, known as shear lag, can significantly reduce the expected moment capacity of non-rectangular reinforced concrete walls. This study focuses on shear lag effects in reinforced concrete U-shaped walls, which are commonly used as lateral load resisting elements in reinforced concrete buildings. An extensive number of finite element modelling analyses are conducted to estimate the vertical strain distributions across the web and flanges of a U-shaped wall with different axial load ratios and longitudinal reinforcement detailing. The results show that shear lag effects are prominent and sometimes significant in U-shaped walls, particularly for the wall sections perpendicular to the direction of loading.

Keywords : shear lag, walls, U-shaped, moment-curvature

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