Simplified Equations for Rigidity and Lateral Deflection for Reinforced Concrete Cantilever Shear Walls

Authors : Anas M. Fares

Abstract : Reinforced concrete shear walls are the most frequently used forms of lateral resisting structural elements. These walls may take many forms due to their functions and locations in the building. In Palestine, the most lateral resisting forces construction forms is the cantilever shear walls system. It is thus of prime importance to study the rigidity of these walls. The virtual work theorem is used to derive the total lateral deflection of cantilever shear walls due to flexural and shear deformation. The case of neglecting the shear deformation in the walls is also studied, and it is found that the wall height to length aspect ratio (H/B) plays a major role in calculating the lateral deflection and the rigidity of such walls. When the H/B is more than or equal to 3.7, the shear deformation may be neglected from the calculation of the lateral deflection. Moreover, the walls with the same material properties, same lateral load value, and same aspect ratio, shall have the same of both the lateral deflection and the rigidity. Finally, an equation to calculate the total rigidity and total deflection of such walls is derived by using the virtual work theorem for a cantilever beam.