Shear Strength of Reinforced Concrete Piers and Piles with Hollow Circular Cross Section

Substructures in bridge engineering may be comprised of reinforced concrete piers and piles with hollow, circular cross section. Such members normally have a larger flexural strength to weight ratio than similar solid members. They are, however, more shear critical owing to the hollow core. Guidelines and code rules for shear strength evaluation of such members are almost non-existent. This paper deals with the problem using a plasticity approach. It is assumed that the shear strength of the member will, depending on the compressive normal force, be governed either by shear failure in cracked concrete or by shear failure in uncracked concrete. This distinction makes it possible to calculate the enhancement effect of axial compression on the shear capacity. To distinguish between the two types of failure, it is proposed to combine a classical upper bound model with the so-called crack sliding model. Results obtained from the model are compared with test results found in the literature. Good agreement has been found.

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