

Worachet Suwan 2011: Behavior of Cast-in-Place Anchors under Static and Cyclic Tension Loading using Finite Element Method. Master of Engineering (Civil Engineering), Major Field: Civil Engineering, Department of Civil Engineering. Thesis Advisor: Assistant Professor Kitjapat Phuvoravan, Ph.D. 143 pages.

The purpose of this research is to study the nonlinear analytical results on behavior of single cast-in-place anchors (Headed Anchor) in originally uncracked concrete under cyclic loading by finite elements method. The pull-out behavior such as strength, failure mode, and crack patterns of the anchorage are investigated. The anchorage problem were analyzed as a three-dimension (3D) analysis model utilizing various elements for different materials. Concrete and headed anchor were represented by 3-D solid elements, incorporating nonlinear property for both materials. The contact interface between concrete and headed anchor were modeled by zero thickness contact elements. In order to save computational time, the analysis was one-sixth symmetric modeling. Cyclic tension load was applied on the top of shank of headed anchor at a frequency of 0.5 Hz. The analysis results revealed that the model could well predict the behavior of headed anchor in uncracked concrete under both static and cyclic loadings. The ultimate tension loads and displacements obtained from the analyses were in acceptable accuracy comparing to the experimental results.

This study also investigated the parameters that influenced to ultimate tensile strength of anchors embedded in concrete. It was found that when the effective depth is increased 2 times, the ultimate tensile strength increased by 2.66 times. However, when the ultimate compressive strength of concrete is increased 2 times, the ultimate tensile strength morely increased 1.32 times. Thus, it canbe concluded that, when comparing to the ultimate compressive strength of concrete, the effective depth has greater influence on the ultimate tensile strength of embedded anchors.

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