

Title: Effect of anchor geometry on uplift resistance of plate anchor in sloping terrain

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Abstract: Plate anchors are employed in various applications, including offshore constructions, mooring systems, transmission towers, etc., to counteract uplift forces caused by outwardly directed loads above or below the ground. Relatively limited focus has been directed towards the uplift capacity of plate anchors on purely frictional sloping terrain, especially regarding the impact of various anchor shapes. The study investigates the effect of anchor geometry, slope inclination, [internal friction](#) angles, and [embedment](#) ratios on anchor uplift capacity through a rigorous three-dimensional [finite element model](#) using PLAXIS 3D. Several numerical and experimental studies have been compared to the current findings to validate the model. The findings show that the anchor geometry and the steepness of the slope significantly impact an anchor's uplift capacity. The uplift capacity is represented in terms of the nondimensional break-out factor. Breakout factors decrease with the increase of anchor length-to-width ratios and slope inclination angles. Moreover, the study demonstrates how the inclination angle of a slope affects the failure mechanisms. In addition, the shape factor is introduced to evaluate further how anchor geometry affects pullout capacity. To evaluate the effect of shape variations and slope inclinations, the study provides mathematical equations that allow precise predictions of anchor uplift capability.

Keywords: Plate anchor; Uplift capacity; Breakout factor; Anchor geometry; Shape factor; Slope inclination;

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