

## **Torsional behaviour of GFRP-reinforced concrete pontoon decks with and without an edge cutout**

Xian Yang<sup>1</sup>

<sup>1</sup> University of Southern Queensland

Using glass fibre-reinforced polymer (GFRP) bars in precast concrete pontoon decks in aggressive marine environments would eliminate corrosion problems encountered with steel reinforcement. Although wave action usually subjects pontoon decks to torsion, little is known about the behaviour of such structures. Moreover, nothing is known about the effects of cutouts on the torsional behaviour of pontoon decks. This study experimentally investigated the torsional behaviour of GFRP-reinforced concrete (RC) pontoon decks in terms of the effect of edge cutouts, reinforcement-bar distribution, and rotation direction. The results show that the bar configuration affected the failure behaviour and torsional capacity of the GFRP-reinforced concrete decks under torsion. The decks with double-layer reinforcement exhibited slower and narrower cracking growth in the post-cracking stage than the decks with single-layer reinforcement. In addition, the edge cutouts reduced the cracking torque of the solid rectangular decks by an average of 17%. The torsional behaviour of the GFRP-reinforced decks can be accurately described by the ACI318-14 equation in the cracking stage, while the decks' post-cracking torsional rigidity can be predicted accurately from the contribution of the GFRP bars.