

Analysis and validation of Stress Concentration through Various Cutout Orientation in Plates

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Abstract: Perforated plates with cutouts(or holes) are extensively used in structural members. These cutouts give stress concentration in plates. Extensive studies have been carried out on stress attention in perforated plates, which consider cutout shapes, boundary conditions, plainness of cutouts, and more. This study presents stress attention analyses of perforated plates with not only colorful cutouts and plainness but also different cutout exposures. Especially, the effect of cutout exposure on stress attention is emphasized since structural members have come more complicated lately. To gain stress attention patterns, a finite element program, ANSYS, is used. For the designated thing, three parameters are considered as follows the shapes of polygonal cutouts(circle, triangle, and square), plainness(a counter measure of compass rate, r/R), and gyration of cutouts(θ). From the analyses, it's shown that, in general, as plainness increases, the stress attention increases, regard lower of the shape and gyration. A more important finding is that the stress attention increases as the cutouts come more acquainted from the birth, which is the positive vertical axis(x). This fact demonstrates that the exposure is also a fairly significant design factor to reduce stress attention. By aligning those polygon cutouts duly, we can reduce stress concentration.

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