

Stress concentration factors of various adjacent holes configurations in a spherical pressure vessel

Abstract

The analysis of stress concentration factor (SCF) of adjacent holes in a spherical pressure vessel can be approached by considering a thin plate undergoing hydrostatic stresses. This work adopts the approach to investigate the SCF of various adjacent holes configurations in a spherical pressure vessel using finite element analysis. The von Mises stress is considered to determine the SCF. Various arrangements of adjacent holes are investigated i.e., two, three, four, and five adjacent holes are taken into account. The SCF curves with respect to the ratio of the distance between adjacent holes to the diameter of hole, L/d , and for a certain ratio of the diameter of hole to the plate thickness, d/t , are then plotted. The results show that the decreasing of L/d will affect the increasing of SCF, while for the case of five adjacent holes configuration, the increasing of d/t doesn't make any significant effect to the increasing of SCF.

Keywords — Adjacent holes, circular thin plate, finite element analysis, spherical pressure vessel, stress concentration factor (SCF).