

Analysis and Simulation of Pressure Vessels under Complex Dynamic Conditions

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Abstract: Pressure vessels are closed containers designed to hold gases or liquids at a pressure substantially different from the ambient pressure. They have a variety of applications in industry, including oil refineries, nuclear reactors, vehicle airbrake reservoirs, and more. The pressure differential with such vessels is dangerous, and due to the risk of accident and fatality around their use, the design, manufacture, becomes critical for operation and inspection of pressure vessels.

In this article, a review of the state of the art for pressure vessels, which are placed on floating platforms that are affected by weather conditions such as wind and operating conditions of the fluid H₂O and its movement, is carried out. Finite element analyses (FEA) were developed and results showed that the effect of the external pressure is not confined to the length of the jacket.

The objective of this work is to design and select a pressure vessel from CAD design software, which was then exported to ABAQUS to create a FEA simulation. The vessel was made of steel SA516-70. Wind speed was converted to an external pressure load. Maximum stresses and deformations were obtained in order to analyze the mechanical behavior of the container.

Keywords: Pressure Vessels, FEA, Stress