

CYLINDRICAL STEEL TANKS UNDER BLAST LOAD

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Abstract : *Analyzing the response of typical process structural units such as steel storage tanks under blast loads remains challenging. In such extreme transient problems, an accurate prediction of both blast loading and geometrical and/or material nonlinear structural response are required. Whilst coupled CFD-FEM simulations can now be performed, closed-form simplified analytical or semi-empirical models are usually preferred because of their speed and versatility. To assess the validity of simplified analytical models as reliable design tools and to check the conformity of numerical simulations, experimental small scale benchmark studies have been carried out. A first series of blast tests were performed on rigid instrumented cylinders to quantify the loading in terms of time and space pressure distribution. A second series were performed on flexible cylinders to quantify the structural response. Simplified semi-analytical models based on Donnell's equations and critical imperfection amplification thresholds were used to predict damage. Numerical results compared well to the experiments.*