RESPONSE OF STRUCTURES TO SMALL AND MEDIUM BLAST LOADS

By

Ahmed Mahmoud Khalil Ibrahem

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
In
Structural Engineering

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Under the Supervision of

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RESPONSE OF STRUCTURES TO SMALL AND MEDIUM BLAST LOADS

Key Words:
Blast loads; Explosions; Barriers; Chambers; Concrete Nonlinearity

Summary:

Civil engineering structures are sometimes subjected to small and medium blast loads. This study investigates the effects of material nonlinearity, reinforcement ratio, and structure shape on the performance of chambers and barriers subjected to blast loads.

The results showed that the linear analysis of blast loads is more conservative than the nonlinear one as it produces higher stress values. However, linear deformations are less than their corresponding nonlinear ones. For explosions inside rooms, increasing the reinforcement ratio decreased the damage index, the stresses, and the deformations. For barriers, the use of small radius of curvature led to a decrease in damage index and critical stresses. Compared to rectangular rooms, circular rooms showed less damage index, smaller stress, and smaller deformations.

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