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Numerical investigation of the buckling strength behavior of ring stiffened submarine pressure hull

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Abstract

A growing trend in the design of the submarine proves the need for increasing the level of water depth, especially for the military activities. Moreover, the complexity of modern submarines and their demand for efficiency, safety, and greater reliability, is a challenge for designers in making the design of submarine particular component known as pressure hull . The pressure hull is the main load-bearing structure in a naval submarine . The basic structural component is a ring-stiffened cylindrical metallic shell under an external hydrostatic pressure load. The ring-stiffeners forestall buckling of the shell until the material exhibits yielding, thereby taking advantage of the full material strength and increasing the structural efficiency. The aim of the paper is to investigate the buckling strength behavior of ring stiffened submarine pressure hull . The influence of the bulkhead positions on the buckling strength behavior of the ring stiffened submarine pressure hull are presented and discussed. © IAEME Publication.

Author keywords

And Submarine Pressure Hull ; Buckling Strength Behavior ; Ring Stiffened Structure

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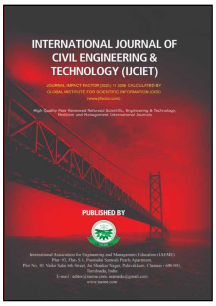

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NUMERICAL INVESTIGATION OF THE BUCKLING STRENGTH BEHAVIOR OF RING STIFFENED SUBMARINE PRESSURE HULL

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ABSTRACT

A growing trend in the design of the submarine proves the need for increasing the level of water depth, especially for the military activities. Moreover, the complexity of modern submarines and their demand for efficiency, safety, and greater reliability, is a challenge for designers in making the design of submarine particular component known as pressure hull. The pressure hull is the main load-bearing structure in a naval submarine. The basic structural component is a ring-stiffened cylindrical metallic shell under an external hydrostatic pressure load. The ring-stiffeners forestall buckling of the shell until the material exhibits yielding, thereby taking advantage of the full material strength and increasing the structural efficiency. The aim of the paper is to investigate the buckling strength behavior of ring stiffened submarine pressure hull. The influence of the bulkhead positions on the buckling strength behavior of the ring stiffened submarine pressure hull are presented and discussed.

Key words: Ring Stiffened Structure, Buckling Strength Behavior, and Submarine Pressure Hull.

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CASE STUDY OF LOW COST STRUCTURE: ANALYSIS AND COMPARISON OF STRUCTURAL WALL WITH ITS COSTING

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ABSTRACT

The problem of the cost of construction work is main one that is rarely not been considered by the construction clients, constructors and, of course, surveyors. The cost of constructing a building project is the important and main concern for the majority of construction clients. The main and primary questions of clients have, what is it going to cost me? " often followed closely by ,can we make it cheaper?" The solution of such questions is intention of quantity surveyors, whose task is to predict the cost of building work and to manage the evolving project design to guarantee that the client's approved fund is not exceeded. This is a difficult task, which frequently involves incomparable, purpose of buildings. Beside cost another problem is too much of time consuming, during construction time period if some destruction occurs the duration time will be increased at higher rate. In rainy season, the construction work cannot be done easily. There is much amount of damage in the walls due to corrosion. The daily wages of the laborers summing increased. More water required for curing. There is problems in the design of the structure, the assumption of carrying load is sometimes not proper. So the demolition happens, which is the major drawback.

Key words: Low Cost, Smart wall system, Traditional system.

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STRENGTH ANALYSIS OF CORN COB ASH AND KENAF FIBRE COMPOSITES

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ABSTRACT

The effects of corn cob ash (CCA), a pozzolan and kenaf fibre (KF) a natural plant fibre on the compressive strength properties of cement composites were investigated in this study. Ordinary Portland cement (OPC) replaced with CCA at different proportions and the KF reinforced composites derived were used to produce roofing sheets. Concrete cubes specimen of 100 × 100× 100 mm^3 were used for mechanical properties consideration in this work. The composite without KF and CCA replacement for OPC were used as the control and OPC with CCA replacement of 5%, 10%, 15%, and 20% were tested for compressive strength characteristics at 7, 14, 21 and 28 days curing time. The mix ratio adopted for this work was 1:3, a table vibrator was used while the quarry dust used allowed water/cement ratio of 0.6 to attain workability. The control (0% CCA and 0% KF) experiments have lower compressive strength values that increased from 7 to 28 curing days than those which contained KF and CCA replacement for OPC at 5%. The compressive strength was found to increase with curing age from 7-28 days while the result showed decreased strength as the CCA increased from 15-20% in the matrix. MatLab R2013 model was used to analyse the compressive strength results from experimental investigations carried out. The results of the effect of CCA on compressive strength at 0, 5, 10, 15 and 20% CCA replacement of Portland Cement and 0% KF ranged from 5.19 to 8.25 N/mm^2, 7.68 to 9.97 N/mm^2, 8.56 to 12.34 N/mm^2, 4.06 to 7.24 N/mm^2,4.07 to 7.21 N/mm^2. The maximum value (12.42±0.6 N/mm^2) of compressive strength was obtained at 5% CCA contents with 7.5% KF. The effect of CCA on the compressive strengths was significant at P > 0.05 both in row and column of the matrix language adopted in MatLab analysis of variance (ANOVA).

Key words: Compressive strength, Corn Cob Ash, Kenaf Fibre, Pozzolan, composites, mix ratio.

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3-D MODELING OF FRONTAL BOLTING

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ABSTRACT

The simulation of the bolting by finite element method consists in its most general form to represent the inclusions by massive or rod element and to assemble them with the corresponding mesh ground. The action of the bolts is underestimated because we can't take the confinement that they bring into account correctly. The limitations of the existing simplified approaches, pushed us to seek alternative means which are supposed to be more satisfactory and more practical to simulate bolting. A model of 3-D behavior has been implemented in the 3-D tunnel calculation code plaxis. The confrontations between the experimental results and the numerical simulations will be presented.

Key words: simulation, frontal bolting, finite elements, substitution, face distance, Excavation phase.

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1. INTRODUCTION

In many configurations, difficulties in predicting the behavior of underground structures, especially those in non-resistant ground, raise questions about the various factors that may justify this inadequacy between prediction and observations (Baud et al 2000; Muir 1979) [6,1]. Numerical calculations are used to study several configurations and offers several solutions to predict disturbances of the internal equilibrium of the ground (Meguid et al 2008 ; Pellet et al 2002) [5,8].