COMPARISON OF DIFFERENT THIN SHELL THEORIES

FOR

FREE VIBRATION ANALYSIS OF CYLINDRICAL SHELL

A dissertation
presented to
the faculty of
Department of Civil and Environmental Engineering
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In Partial Fulfillment
of the Requirements for the Degree
Master of Technology

By
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JULY-2013

CERTIFICATE

The undersigned have examined the dissertation entitled

COMPARISON OF DIFFERENT THIN SHELL THEORIES

FOR

FREE VIBRATION ANALYSIS OF CYLINDRICAL SHELL

presented by Monica Ronchhiya
a candidate for Master of Technology
and hereby certify that in their opinion it is worthy of acceptance

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Dr. S.K. Panda

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Dr. Munendra Kumar

DECLARATION

I Certify that

a. The work contained in this thesis is original and has been done by me under the guidance of my supervisor.
b. The work has not been submitted to any other Institute for any degree or diploma.
c. I have followed the guidelines provided by the University in preparing the thesis.
d. I have conformed to the norms and guidelines given in the Ethical Code of Conduct of the Institute.
e. Whenever I have used materials (data, theoretical analysis, figures, and text) from other sources, I have given due credit to them by citing them in the text of the thesis and giving their details in the references.

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OBJECTIVE

To find out natural free vibration frequency of a thin cylindrical shell by using different thin shell theories and comparison between the results obtained.

ABSTRACT

In this thesis a study on the thin cylindrical shells have been done. Various thin shell theories have been studied. And further by using these theories free vibration frequency of a thin cylindrical shell which is made of isotropic aluminium material is observed. The material properties and dimensions of the cylindrical shell are given in the thesis. The cylindrical shell has been taken simply supported. Further to study the free vibration of simply supported circular cylindrical shells, a semi-analytical procedure is discussed in detail. In this technique, beam function is used as an approximation for simply supported boundary conditions. A literature review reveals that beam functions are used extensively in predicting natural frequencies of shells. Since this method does not involve with boundary condition equations, there is no need to deal with intense calculations. So this method was applied to ten different shell theories 1) Donnell-Mushtari, 2) Love-Timoshenko, 3) Arnold-Warburton, 4) Houghton-Johns, 5) Flugge-Byrne-Lur'ye, 6) Reissner-Naghdi-Berry, 7) Sanders, 8) Vlasov, 9) Kennard-Simplified and 10) Soedel .

Natural frequency of the thin cylindrical shell has been found from these 10 theories and is compared in a table. The approximate procedure was compared favourably with experimental results.