**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

Delhi Technological University-Delhi



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

Dr. S.K. Panda

Dr. Munendra Kumar

**DECLARATION**

I Certify that

1. The work contained in this thesis is original and has been done by me under the guidance of my supervisor.
2. The work has not been submitted to any other Institute for any degree or diploma.
3. I have followed the guidelines provided by the University in preparing the thesis.
4. I have conformed to the norms and guidelines given in the Ethical Code of Conduct of the Institute.
5. 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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**ACKNOWLEDGEMENT**

I would like to sincerely and wholeheartedly thank my advisor Dr. S.K. Panda and Dr. Munendra kumar for their close guidance, kindness, encouragements, patience, and supervision throughout various stages of the dissertation. Without their help and encouragement, this dissertation would not be possible.

I wish to convey my sincere gratitude to Prof. A.K. Gupta (former H.O.D) and Prof. A. Trivedi (H.O.D), and all the faculties of Civil Engineering Department, Delhi Technological University who have enlightened me during my project.

Most importantly, I would like thank my parents, for their unconditional support, love, and affection. Their encouragement and endless love made everything easier to achieve.

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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.