A Nonlinear Model for Shells with Variable Thickness

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The intensive development of nonlinear shell theory is mainly connected to its wide applicability in thin walled structures, in civil engineering or in aircraft and ships body structures, where lightweight and optimal shape are essential. For these reasons, such "thin" structures usually have non-constant thickness.

In this work, we propose and, using the method of formal asymptotic expansions, we justify a *shell model "of Koiter's type" for nonlinearly elastic shells with variable thickness*, which extends that proposed by Ciarlet [2002] for shells with constant thickness.

We also show that nonlinearly elastic shells with variable thickness have two essentially distinct limit behaviors as their thickness approach zero, either that of a nonlinearly elastic membrane shell or that of a nonlinearly elastic flexural shell with variable thickness. Detailed results and proofs can be found in Gratie [2002].

References

[1]. Ciarlet, P.G. [2002]: A two-dimensional nonlinear shell model of Koiter's type. *Proceedings of the Conference in the Honor of Jean Leray*, Kluwer, Dordrecht, to appear.

[2]. Gratie, L. [2002]: Two-dimensional nonlinear shell model of Koiter's type with variable thickness, to appear.