Thin-walled laminated structures: buckling, vibrations and their suppression

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Abstrak

This book presents a theoretical approach that allows the analysis of structures with magnetorheological and electrorheological layers, and shows, with the help of examples, how the mechanical behaviour of thin-walled laminated structures can be influenced.
It consists of six chapters:
Chapter 1 presents a brief overview of derivation approaches for theories of thin-walled structures, modelling of composites and modelling of laminated and sandwich structures.
Chapter 2 describes the equivalent single layer model for thin laminated cylindrical shells, including the special cases of plates and beams. In addition to the classical mechanical properties, it also considers the electrorheological and magnetorheological properties.
Chapter 3 presents the elastic buckling of laminated beams, plates, and cylindrical shells, discussing various problems, such as the influence of the boundary conditions, external loading and magnetic fields. It also suggests different approximations for asymptotic methods.
Chapter 4 focuses on the free vibrations of elastic laminated beams, plates and cylindrical shells, investigating the influence of the boundary conditions and other factors.
Chapter 5 presents the latest results concerning vibration of laminated structures composed of smart materials and discusses in detail the influence of electric and magnetic fields on smart structures. These results provide insights into the optimal design of these structures.
Lastly, Chapter 6 features a short appendix presenting asymptotic estimates and series.