



Modeling and control of thin plate structures by piezoelectric actuators and sensors

By Daniel W. Huber

Trauner Verlag Sep 2011, 2011. Buch. Book Condition: Neu. 24x17x cm. Neuware - The present thesis is concerned with the tracking of the displacement field of thin plate structures using piezoelectric transducers. A first example demonstrates the possibilities and limitations of beam theory. Hence, in the main part of the thesis an analytical model based on Kirchhoff's plate theory is derived in order to take into account the dependency of the transverse displacement on the lateral coordinate due to the piezoelectric transducers. The mechanical equations are extended to include the indirect piezoelectric effect by a refined constitutive relation. Furthermore, effective parameters are introduced in order to incorporate the direct piezoelectric effect and an approximated solution is derived. The second main topic of the thesis is concerned with the task of displacement tracking for thin plate structures. Therefore, the derived analytical model is utilized to solve this inverse problem using an actuator network. A pure feedforward approach is introduced to derive proper weights and locations for each member of the network to prescribe an arbitrary displacement field to the structure and additionally the method is extended to a feedback approach, by choosing a collocated sensor network. Two numerical examples are studied...



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