



Acoustic guitars have been used for centuries. The quality of the instrument highly depends on the selected materials and craftsmanship. Besides, the instruments from the same product line may have minor variability that would produce audible differences in the sound quality. If the effect of the structural parameters on the response of the guitar is predictable, some modification can be performed in order to obtain desired tonality features. Therefore, accurate simulation models are required for developing a guideline for the manufacturers. Finite element methods (FEM) are the most widely used for modeling guitar bodies, e.g. for simulating the influence of the top thickness or the bracing. The quality of the modeling can be verified by comparison with measurements.

Although there have been many experimental and numerical studies conducted on acoustical guitars in the literature, the complexity and the authenticity of the instrument have been preventing general assumptions for representative behaviors.

The proposed thesis will investigate the effect of the mechanical properties of the tone woods. The topic includes vibro-acoustical modelling with several design parameters in order to cover the general response of high quality instruments.

The following steps can be defined as the outline for the offered study:

- Literature survey for the current researches on modelling acoustical instruments
- Detailed CAD modelling of the selected acoustic guitar
- Simulating vibro-acoustic test cases using BEM (Boundary Element Method)/FEM software
- Optimizing the geometrical and mechanical properties for selected attributes

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