Master Thesis
Implementation of complex coupling interfaces for Plate Assemblies using a Wave Based Method

Motivation
The examination of Vibro-acoustic behaviour of physical systems often involves calculations at frequencies in the mid-frequency range. In case of using the FEM (Finite element method) this requires rather simple structures to be discretized very fine in order to be able to represent the short wavelengths in the structure. Statistical methods, namely the Statistical Energy Analysis, can handle high frequencies. Never the less if the frequency become too low, certain prerequisites are not fulfilled anymore. Therefore, in the past several methods to cover this mid frequency region have been developed, especially relevant for Vibro acoustic considerations. Amongst them is the Wave Based Method (WBM) [1] as an Indirect Trefftz Method.

The method approximates the solution by so called wave functions. With the help of a weighted residual approach, the integrated errors over the domain boundaries are minimized. The unknowns then are the Contribution factors of the different wave functions.

The WBM has been extended for vibrations of plate assemblies [2]. In a previous work an implementation in Matlab © has successfully been tested for plates in bending and membrane action under the restriction of simple geometries [3]. In the scope of this thesis the WBM shall be extended to be able to represent folded structures.

Task
The work builds upon an existing Matlab © code for plates in bending and membrane action. In a first step, the implementation and theory of this code needs to be understood.

In a second step the wave based method shall be implemented for plate assemblies decomposed of several elements, consisting of either plates in bending or membrane action.
Furthermore joints shall be included. Also complex interface conditions such as inclined angles shall be considered from a theoretical point of view, to be able to model folded structures located in a 3-dimensional space.


**Supervisor**

Hannes Englert M.Sc. (room N1151) hannes.englert@tum.de