

# Sources of and Influence Parameters on Stator Vibration of large Synchronous Hydrogenerators

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## Abstract

Vibration is the unavoidable by product of a working machine. Nevertheless vibration needs to be kept within limits since it is one of the most important contributors to the deterioration process of machinery.

In order to design machines that work within these limits engineers have ever since tried to avoid excessive vibration excitation using different approaches.

Nowadays modern computational tools allow a detailed simulation of vibration phenomena. In the hydroelectric power business machines for different power plant projects are custom designed each time from scratch. For the preliminary design vibration calculations have to be done before all the details of the final design are available. During the optimisation process these checks may need to be done multiple times.

The models required for these calculations need to be simple for two reasons:

- A high number of degrees of freedom increases computation times
- The models need to be changed quickly during optimisation cycles

In a previous paper Neumayer et al. have presented two different parameterised FEM simulation tools that are used for the design of hydrogenerators. These two tools are used in different stages of the engineering process and are characterised by different levels of complexity and detailedness. Whereas the detailed model may cover a large number of special design features of the core, housing and foundation, the preliminary model needs to be reduced in such a way that sufficiently accurate vibration results will be obtained.