

# Prediction of Noise Generated By Electromagnetic Forces in Induction Motors

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## Abstract

Induction motors, as any other industrial products, have to comply with various requirements on noise levels. Therefore, it is essential to use an appropriate prediction tool to verify and optimize the design of an induction motor with respect to the acoustic performances.

Three main sources of sound can be identified in induction motors: mechanical noise from bearings and unbalance effects, airflow noise due to the cooling fan and magnetic noise produced by electromagnetic forces in the motor air gaps.

The paper will focus on the prediction of the magnetic noise generated and radiated by a specific motor. The challenge is here in the multi-disciplinary character of the problem. The model should consider the mutual coupling between the electromagnetic forces, the mechanical displacements and the acoustic pressure field.

The finite element model coupling the different physical fields has been developed by using COMSOL Multiphysics®. Some simplifications have been introduced to reduce problem size and computing time.