

Notice of dissertation defense

24.10.2018

Effect of elastic stress on the magnetic properties of electrical steel

Title	Multiaxial Magneto-Mechanical Interactions in Electrical Steel Sheets
Content	<p>Electrical machines account for around 40% of total global electricity consumption releasing approximately 6000 Mt CO₂ annually. It is clear that, in order to meet the future energy demands, efficiency of the electrical machines should be improved. Indeed, policy makers impose strict demands on the electrical machine efficiencies for the present and future.</p> <p>Obviously, the efficiency can be increased by reducing the losses. In order to do that, first we should understand the source of the losses. Considering the manufacturing processes of rotating electrical machines, the cores are punched, pressed, welded together and shrink fitted to the housing and shaft. Due to these processes, significant mechanical stresses are exerted on the core material. These stresses are multiaxial in nature, and they alter the magnetic properties of the core material, affecting the iron losses. Magneto-elastic interactions in ferromagnetic materials are not only responsible for additional losses. For instance, due to these interactions stator vibrations in electrical machines and audible noise generation in transformers occur.</p> <p>Clearly, in order to design more efficient devices and analyze existing ones with higher accuracy, comprehensive multiaxial magneto-mechanical characterization and modeling of ferromagnetic sheets are needed. This thesis aims to contribute to this field by studying the multiaxial magneto-mechanical interactions in electrical steel sheets both experimentally and numerically.</p>
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The dissertation is publicly available on the notice board of the Aalto University Learning Hub Atrium, Maarintie 8.