Analytical Calculation of Winding Overtemperatures and Estimation of Feasible Current Densities for Electrical Machines

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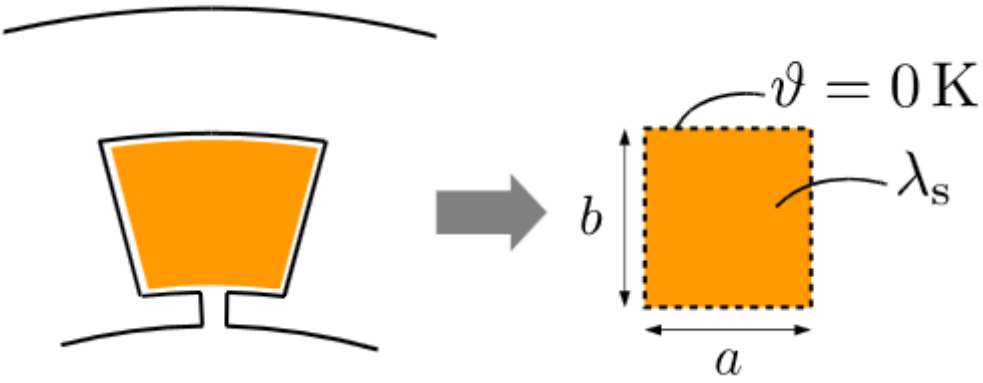
Abstract **- At early design stages of electrical machines, electrical loading is often determined based on experience or values given in literature. As dimensions and topologies of electrical machines vary widely depending on the application, latter approach can only provide a rough assessment on feasible current loadings and current densities. This paper presents an analytical equation on the calculation of winding overtemperatures as well as feasible current densities by approximating the slot geometry by a square shape and utilizing an effective thermal conductivity.**

Keywords— Electric Machines, Current Density, Ohmic Losses, Stator Slots, Winding Temperature



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