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The analysis of shaft voltages in a synchronous generator with various induced faults

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Abstract

Axial shaft voltages have been investigated as a condition monitoring tool for turbo-generators. It was found that static air-gap eccentricity in a 20 kW, 2 pole synchronous generator, which was designed and built to mimic a larger 660 MW set, can be diagnosed using the shaft voltage. The shaft voltage in this experimental alternator has been simulated using 2D finite elements method (FEM) software. This software has been used to explain some of the causes of the shaft voltage in this generator. It was confirmed that shaft signals are primarily caused by constructional asymmetries. The FEM software has also been used to study the effects of various faults on the shaft voltage in a time efficient manner. These faults should be investigated experimentally in future work.