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## Brushless doubly fed machine magnetic field distribution characteristics and their impact on the analysis and design

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### Abstract

This paper contributes to the characterisation of the brushless doubly fed induction machine (BDFIM), which is attractive as a variable speed generator in applications (off-shore wind turbine) with minimum maintenance requirements. The BDFIM has two three-phase stator windings of different pole numbers housed within the same stator slots and a short-circuited rotor winding capable of coupling fields of different pole numbers. The stator windings and rotor winding create a magnetic field distribution with a range of characteristics different to those of conventional induction machines. This paper presents an analysis to identify the field characteristics and discusses their impact on the analysis and design of the BDFIM. The characteristics are determined from an analysis of the sum of two rotating sinusoidal field waveforms and confirmed by comparison with time-stepping finite element results and measured magnetic flux density data.