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DESIGN AND COMPARISON A HIGH POWER DENSITY MAGNETICALLY GEARED PM GENERATOR TOPOLOGY WITH A RADIAL FLUX PM GENERATOR

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***Abstract*— Direct drive generator arrangement for wind energy conversion promises higher energy yield and higher efficiency than geared wind energy conversion systems. In this paper an electrical machine topology called "Dual Stator Spoke-Array Vernier Permanent-Magnet machine" is evaluated as a magnetically geared direct drive generator. This is because, this topology is known to facilitate reaching higher fundamental flux density in the air gap in comparison with other Vernier type machines and is known to reach higher power factor values. For this evaluation a hybrid analytic-numerical design method is developed which is suitable for use in mathematical design optimization. This design method is used in identifying the optimum designs for magnetic gear ratios of 5, 11 and 17. These optimal designs are compared with optimized radial flux PM generators designed for the same specifications. The findings indicate that it is possible to reduce the weight of a 50 kW input, direct-drive generator running around 60 rpm by about 50% compared to RFPM generator, while keeping the generator and converter cost at the same levels.**