Analysis and Evaluation of an Axial Flux Magnetic Transmission for Eolic Turbins

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This study investigates the development of a durable and efficient model for wind turbine transmission systems, with a focus on overcoming the challenges associated with the maintenance and repair costs of mechanical transmissions while maintaining power transmission efficiency, speed multiplication, and torque requirements. An axial flux magnetic transmission was selected due to its high efficiency, compact design, and reduced mechanical losses. A 3D-printed prototype was created to explore various magnet placements and identify the optimal configuration. Configurations such as 1:2, 1:3, 1:4, 1:5, and 1:6 were tested, and the model that performed the best was the 1:4. The design, featuring a rotor ratio of 1:4, demonstrated performance comparable to traditional mechanical transmissions with reduced friction and wear. The prototype achieved the best performance by converting an initial RPM of 590 to 2360. These findings suggest that the integration of axial flux magnetic transmissions in wind turbines has the potential to improve efficiency, reduce maintenance costs, and enhance the long-term durability of wind energy systems.

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