Optimized power-feedback with an 8.7 kNm-Transverse Flux Generator

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In **direct drive** applications **Transverse Flux Machines (TFM)** have been proposed as a powerful alternative. A working TFG (Generator) and an appropriate power converter were developed and built. **Transient simulation** of the system with relevant disturbance influences is done **efficiently**. A **current control** is used to **optimize power-feedback into the grid**. Measurements show positive results.

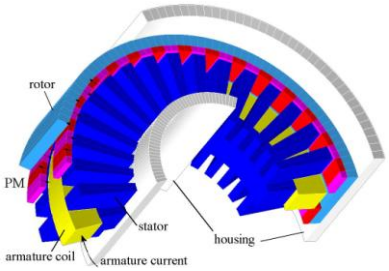

Fig. 1: Structure of a TFM in flat magnet configuration

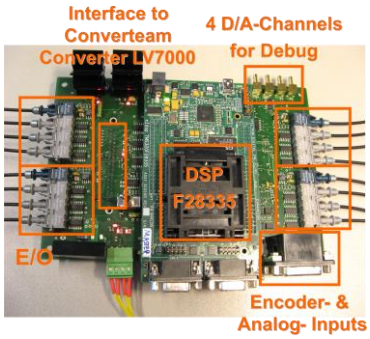

Fig. 2. Controller board with sub-group highlighting

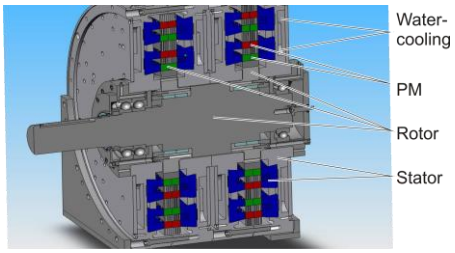

Fig. 3: Section view of the TFG

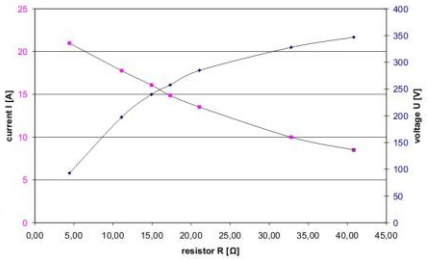

Fig. 4: Current (magenta) / voltage (dark blue) rms values over ohmic load

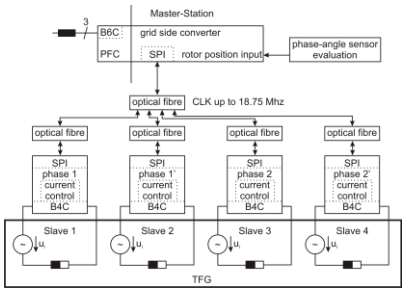

Fig. 5: optical fibre connection between master and slaves

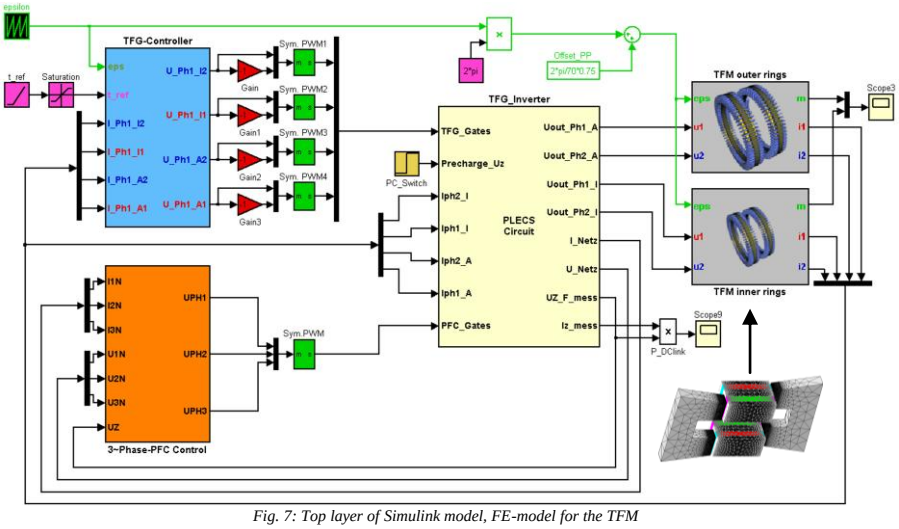

Fig. 7: Top layer of Simulink model, FE-model for the TFM

A TFG with a torque of 8.7 kNm was designed and constructed. Also a microcontroller DSP-Board was developed, that is able to control a four phase converter for grid power feedback. A Simulink model was developed that predicts the operational behavior very accurately, making construction and control development decisions innocuous and accurate, and, accordingly, reducing costs. In test runs we were able to imprint currents that balance the TFG phases and optimize the power output by an active power factor correction.

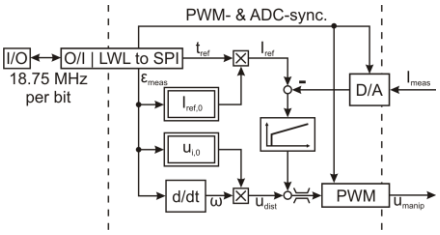

Fig. 7: The control structure for each TFG phase

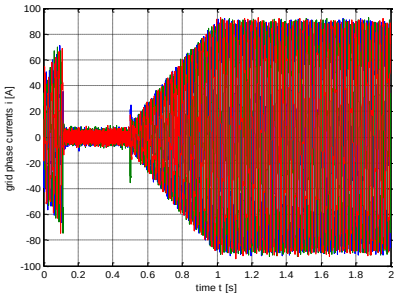

Fig. 8: Grid phase currents

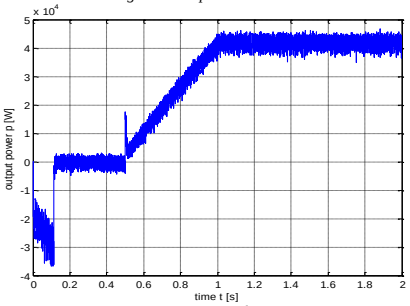

Fig. 9: Output power of the system

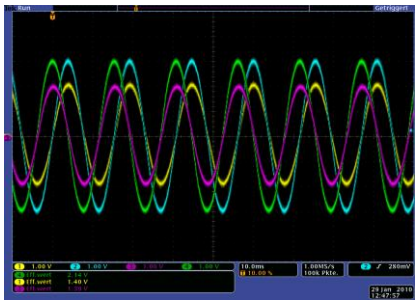

Fig. 10: Measured currents, both inner and outer phases, 12.8 A/V

Fig 11: The TFG and switchgear cabinet