ABSTRACT

In this paper, a multi-objective optimization procedure based on the non-sorted genetic algorithm-II (NSGA-II) for the design of a buried PM wind generators with variable-flux is presented. A comparative analysis is carried out for optimized 13 kW, 100 kW and 1 MW buried-PM variable-flux synchronous generators (VFSG) with PMs buried deep in the rotor cores and additional rotor field coils. A design compromise between goals to minimize the active generator mass and the copper loss ratio of grid compliant wind turbine systems is shown. The generator design and sizing are evaluated during the optimization process with the help of finite element method (FEM) and a pareto front of possible designs obtained. From the pareto fronts a choice is made for the best solution of which a 13 kW buried-PM VFSG prototype, with PMs located in the base of the rotor tooth, is being built for tests and to validate the design procedure.