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**Multi-objective differential evolution based electromagnetic design of wind-turbine generator**

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Renewable energy particularly solar and wind are now being considered as mainstream energy source and are competing at par with conventional ones. Technological innovations and cost efficiencies are driving their growth across the globe and fast increasing their penetration into power grids. In wind generators, doubly fed induction generators (DFIG) have gained popularity due to their efficiency, speed variation, need for less control circuit power and four quadrant operation. However, power grid requirements are becoming stringent in performance needs requiring DFIGs to comply to the technical needs in steady and in power system fault conditions. In this paper, multi-objective differential evolution with dominance filter and Pareto analysis have been used to optimise the electromagnetic design of DFIG. The specific design objectives considered are efficiency, weight reduction, reactive power capability, fault current reduction and transient torque. In all the cases, nine direct variables from magnetic core i.e. stator lamination details, stack length, radial air-gap and two indirect variables like stator winding copper and rotor winding copper sections are considered. The constraints used are limiting flux density values, minimum efficiency, limiting manufacturing dimensions like minimum radial air-gap, minimum core diameter, maximum weight. The reactive power capability depends on generator and grid side and rotor side controllers. In this paper, possibility of increasing the reactive power capacity of generator at design stage, has been studied under different wind speeds conditions. The results are compared and discussed for single objective and multi objective differential evolution.

**Biography**

Mamidi Ramakrishna Rao has completed his Master Degree in Electrical Engineering from Indian Institute of Technology in the year 1970. He worked as product design executive in various manufacturing units. Now he works as a freelance consultant. He has published papers and presented in international conferences in USA, China and in Dubai.

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