

Off Design Modelling of 650MW Combined Cycle Gas Turbine Power Plant Integrated with a Retrofitted Inlet Fogging System

Authors : Osarobo Omorogieva Ighodaro, Josephus Otejere

Abstract : This paper contains the modelling and simulation of GT13E2 combined cycle gas turbine with the aid of the software EBSILON PROFESSIONAL. The design mode was modeled using guaranteed performance data from the power plant, in the off design, temperature variation of ambient air and fogging (spray water at inlet to compressor) was simulated. The fogging was simulated under two different modes; constant fuel consumption and constant turbine exhaust temperature. The model results were validated using actual operating data by applying error percentage analysis. The validation results obtained ranged from -0.0038% to 0% in design condition while the results varied from -0.9202% to 10.24%. The model shows that fogging decreases compressor inlet temperature which in turn decreases the power required to drive the compressor hence improving the simple cycle efficiency and hence increasing power generated.

Keywords : inlet fogging, off design, combined cycle, modelling

Conference Title : ICPSEE 2025 : International Conference on Power Systems Engineering and Energy

Conference Location : New York, United States

Conference Dates : February 15-16, 2025