CHAOTIC WHALE OPTIMIZATION ALGORITHMIC METHODS FOR WIND AND SOLAR BASED COMBINED HEAT AND POWER ECONOMIC DISPATCH PROBLEM REVIEWING

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ABSTRACT

The review points out that the inclusion of wind and solar power in the grid poses serious optimization issues because of their intermittent nature. Efficient coordination with hydro and thermal units is necessary to reduce cost enhance reliability and control emissions. The Chaotic Whale Optimization Algorithm optimizes solutions by using chaotic and oppositional strategies. It manages trade-offs efficiently between cost emissions and reliability and proves superior to various conventional optimization methods. The research establishes that CWOA possesses robust capabilities for large scale integration real time control and dynamic scheduling in next generation sustainable energy systems.

Keywords: *Renewable Energy Integration, Wind Energy, Solar Power, Multi-objective Optimization, Chaotic Whale Optimization Algorithm (CWOA), Meta-heuristic Algorithm*

1. INTRODUCTION

Dasgupta et al [1] applied Sine Cosine Algorithm for hydrothermal wind integrated scheduling with improved cost and emission performance compared to traditional practices. Paramjeet et al [2] utilized economic dispatch with constraint based optimization for CHP wind systems. Lv et al [3] came up with a low carbon model with solar thermal CHP hydrogen and carbon capture for full utilization of renewables. Li et al [4] came up with two stage dispatch for balanced wind PV solar thermal resources scheduling. Mastsfa et al [5] applied GANs coupled with stochastic optimization to model RES uncertainty for better dispatch accuracy and cost reduction by 2.5 percent. Amir et al [6] came up with four new methods for PMO ORPD with uncertainty modeling and DFIG based wind and PV Emad et al [7] came up with a GAMS based dispatch model incorporating RES ESS and CHP to reduce cost and fossil dependence. Fatemeh et al [8] performed EDP challenge classified methods and stressed standard evaluation necessity. Amir et al [9] improved EEPD by integrating RES uncertainty and stability with multi objective evolutionary algorithms. Chenxi et al [10] optimized the CCHP system with AA CAES and wind effectively lowering cost and wind curtailment.

Figure 1 illustrates a centralised smart grid that incorporates various energy sources such as wind solar hydro and thermal Hydro is based on the flow of water solar utilises sunlight wind utilises kinetic energy whereas thermal is fuelled by fossil fuels The intermittent character of renewables makes them