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| **Title:** | Performance Analysis of Automatic Generation Control for a Multi-Area Interconnected System Using Genetic Algorithm and Particle Swarm Optimization Technique | | |
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| **Abstract:** |  |
| The primary focus of this paper is to assess an interconnected power system using different optimization techniques. The main purpose is to employ different optimization techniques, including genetic algorithms (GA) and particle swarm optimization (PSO), to systematically enhance the performance of a multi-area or two-area automatic generation control (AGC) system, aiming to optimize the three PID controllers gain values and improve system performance under diverse loading conditions. The modeling of the two areas includes components such as governors, turbines, and loads, with the tie line representing the interconnection between the two areas. Two case studies are conducted exploring different loading conditions in the megawatt (MW) range, including increasing load demand and decreasing load demand. The analysis involves four scenarios, covering without any kind of controller, another with solely a proportional integral derivative (PID) controller, a PID controller enhanced through a genetic algorithm (GA), and lastly, a PID controller improved through particle swarm optimization (PSO). The optimization process utilizes the integral time absolute error (ITAE) as the objective function to evaluate the system's performance. The simulation outcomes for ITAE, settling time, overshoot, and undershoot for frequency deviation of area one, area two, and power deviation in the tie-line are compared with previous similar studies to assess the novelty of this work. The article highlights the importance of the multi-area AGC system and the significance of | |