Abstract :

In remote regions, electric energy is usually supplied by diesel generators for their reliability, low installation costs, ease of starting, compact power density and portability. However, diesel generators are becoming expensive to run due to increasing fuel cost, transportation costs and they require a high level of maintenance cost. Moreover, using diesel fuel increases the amount of CO2 emitted which is the principal source of green-house gas. A more sustainable alternative system is using renewable sources to produce electrical power. They can play an important role in ensuring an environmentally friendly and clean energy generation for remote and isolated communities. However, renewable energy sources are intermittent in nature, and as a result, power generation from renewable energy sources often may not necessarily match the load demand. Therefore, energy storage is required to ensure reliable power supply. Moreover, the implantation of energy production based on renewable sources requires a specific design in terms of size and control. The objective of this thesis is to propose a methodology to design a hybrid power system based on artificial intelligence. Initially, the cuckoo search algorithm is used to give an optimal size of a hybrid power system that can guarantee the energy required by the load continuously. To overcome the complexity of the control of hybrid power system, an optimal fuzzy logic control based on cuckoo search algorithm is proposed. Finally, optimization of size and control simultaneously is introduced in this thesis to increase the reliability and competitively of system. Keywords:Hybrid power system,Fuzzy logic controller,Loss of power supply probability, Cuckoo search