

A Review on Applications of Evolutionary Algorithms to Reservoir Operation for Hydropower Production

Authors : Nkechi Neboh, Josiah Adeyemo, Abimbola Enitan, Oludayo Olugbara

Abstract : Evolutionary algorithms are techniques extensively used in the planning and management of water resources and systems. It is useful in finding optimal solutions to water resources problems considering the complexities involved in the analysis. River basin management is an essential area that involves the management of upstream, river inflow and outflow including downstream aspects of a reservoir. Water as a scarce resource is needed by human and the environment for survival and its management involve a lot of complexities. Management of this scarce resource is necessary for proper distribution to competing users in a river basin. This presents a lot of complexities involving many constraints and conflicting objectives. Evolutionary algorithms are very useful in solving this kind of complex problems with ease. Evolutionary algorithms are easy to use, fast and robust with many other advantages. Many applications of evolutionary algorithms, which are population based search algorithm, are discussed. Different methodologies involved in the modeling and simulation of water management problems in river basins are explained. It was found from this work that different evolutionary algorithms are suitable for different problems. Therefore, appropriate algorithms are suggested for different methodologies and applications based on results of previous studies reviewed. It is concluded that evolutionary algorithms, with wide applications in water resources management, are viable and easy algorithms for most of the applications. The results suggested that evolutionary algorithms, applied in the right application areas, can suggest superior solutions for river basin management especially in reservoir operations, irrigation planning and management, stream flow forecasting and real-time applications. The future directions in this work are suggested. This study will assist decision makers and stakeholders on the best evolutionary algorithm to use in varied optimization issues in water resources management.

Keywords : evolutionary algorithm, multi-objective, reservoir operation, river basin management

Conference Title : ICCEAC 2015 : International Conference on Chemical Engineering and Applied Chemistry

Conference Location : Rome, Italy

Conference Dates : September 17-18, 2015