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Modified Harmony Search Algorithm for Combined Economic Emission Dispatch of Microgrid Incorporating Renewable Sources

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Abstract

Nowadays, there is a growing interest in the microgrid systems with a high penetration of renewable sources. In this paper, the modified harmony search (MHS) algorithm is proposed to solve the combined economic emission dispatch (CEED) problem of the microgrid taking into account the solar and wind power cost functions. The proposed algorithm can be derived by not only adjusting the parameters but also improving the structure and operation of the original harmony search (HS) algorithm. The solution of the CEED problem of the microgrid taking into account the solar and wind power cost functions is obtained for different scenarios using the MHS algorithm and some recently published algorithms. The results of all scenarios show the effectiveness of the MHS algorithm over other published algorithms employing same data.

Key words: Modified harmony search, combined economic emission dispatch, microgrid, wind power cost function, solar power cost function.

1. Introduction

Microgrid can be defined as a recent small-scale form of the centralized power system. It typically consists of distributed generation (DG) units, energy storage resources and loads that are designed and sited close to the customers in small communities [1].

The DG units used in the microgrid can either be conventional generators (i.e. thermal and diesel generators) or renewable energy sources (i.e. wind power and solar power). However, recently renewable energy sources have been used widely in microgrids due to their cost and environmental

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