HYBRID AC/DC MICROGRID BASED ON HIGHER ORDER SLIDING MODE CONTROL

Proposed By,

Ms. Reshma Mathew,

Assistant Professor,

Department of EEE,

STCET

1.   Introduction

Due to increase in energy demand, the need for augmentation of conventional generation brings about a continuous depletion of fossil fuel sources. So the need for renewable energy is increasing day by day. Reduction of environmental pollution and global warming act as a key factor in preferring renewable energy over fossil fuels. Hence the traditional power generation technique are replaced by renewable energy based microgrid system. Hybrid AC/DC microgrid systems are preferred since they can meet AC and DC loads.

2.   Related work

Hybrid AC/DC microgrid suffers from the problem of intermittency issues in renewable energy sources. While using Fuel Cell with fuzzy logic control technique, overutilization and underutilization of H2 cannot be considered. In distributed control technique, dynamic issues of system is not taken into consideration. Similarly in droop based control techniques, when multiple distributed energy sources are involved there is a chance of poor voltage regulation. In non-linear control techniques such as decentralized Sliding Mode Control, involves the use of two controllers which makes the system complex. In output feedback linearization and back stepping control, does not take into consideration about the effect of multiple DG's. So there is a need of advance control action to ensure stable operation under various operating conditions and load demand.

3.   Proposed Method

The proposed technique involves the design of a non-linear controller based on integral terminal and fast integral terminal Sliding Mode Control for hybrid AC/DC microgrid. With wind energy system as the primary source, Fuel Cell as secondary source and battery ultra capacitor as HESS. But irregularity in Wind Energy system and variations in AC/DC loads result in fluctuations of DC link voltage. So HESS can be used to provide constant AC and DC bus voltage in islanding and grid connected mode. The proposed control technique provides frequency support to utility grid in grid connected mode. Also stability of hybrid AC/DC microgrid can be verified using Lyapunov's stability criteria.

References

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