Fuzzy control of energy storage charging and discharging

What are fuzzy logic controllers & how do they work?

Two fuzzy logic controllers have been developed,namely the charging station controller and the vehicle-to-grid controller. Together they decide the proper energy flow between the EVs and the grid. Energy discharge to the grid from EVs or energy required for charging EVs is controlled and tested for the real-time scenario.

Why do we need fuzzy controllers?

This is due to the fact that fuzzy controllers take into account in the decision making the technical operational limits of the electrical system under study, such as violations of the voltages in the buses, state of charge (SOC) of the EV batteries, and the power flows, for this time elapsed of the fuzzy controllers required 9.58 s.

What is smart charging & discharging?

Smart charging In the smart charging/discharging strategy,EVs are charging or discharging in coordinated mode. During the off-peak period,when the price of electricity is lower,EVs will be charged and in the peak period,when the price of electricity is highest,EV batteries will be discharged into the utility grid.

How does V2G technology help EV charging & discharging?

The controller of the charging station will decide the participation of EVs to charge or discharge in aggregate form. The coordinationof the charging or discharging of EVs allows V2G technology to assist ancillary services such as frequency regulation,voltage regulation,harmonic cancellations,loss reduction,among others.

What is particle swarm optimisation (PSO) based fuzzy logic controller (FLC)?

Abstract : Aiming at reducing the power consumption and costs of grids, this paper deals with the development of particle swarm optimisation (PSO) based fuzzy logic controller (FLC) for charging-discharging and scheduling of the battery energy storage systems (ESSs) in microgrid (MG) applications.

What are tree charging strategies?

Tree charging strategies were adopted: peak charging,off-peak charging,and smart chargingbesides demand-side management techniques. In addition to the charging process will also be studied the battery electric vehicles discharging,preferably at the peak of the load curve,through the creation of a charging/discharging station.

Two fuzzy logic controllers have been developed, namely the charging station controller and the vehicle-to-grid controller. Together they decide the proper energy flow between the EVs and the grid. Energy discharge to the grid from EVs or energy required for charging EVs is controlled and tested for the real-time scenario. The ...

Fuzzy control of energy storage charging and discharging

Two fuzzy logic controllers have been developed, namely the charging station controller and the vehicle-to-grid controller. Together they decide the proper energy flow between the EVs and the grid. Energy discharge to the grid from EVs or energy required for charging EVs is controlled and tested for the real-time scenario.

The charging process and discharging process techniques of EVs are classified into two types controlled and uncontrolled, respectively. The uncontrolled method described does not involve the transmission of any details about the system from the user to the grid operator, which can potentially lead to issues such as instability of the grid, poor power quality, ...

Two fuzzy logic controllers have been developed, namely the charging station controller and the vehicle-to-grid controller. Together they decide the proper energy flow between the EVs and ...

Aiming at the dual closed-loop control of dual-active bridge (DAB) charging and discharging circuits in energy storage devices, which is difficult to allocate discharging current ...

This paper presents the fuzzy based charging-discharging control technique of lithium-ion battery storage in microgrid application. Considering available power, load demand and battery...

A fuzzy control strategy for battery charging or discharging used in a renewable power generation system is studied in the paper. Three working status of a battery in different energy ...

Abstract : Aiming at reducing the power consumption and costs of grids, this paper deals with the development of particle swarm optimisation (PSO) based fuzzy logic controller (FLC) for...

To address the frequency fluctuation problem caused by the power dynamic imbalance between the power system and the load when a large number of new energy sources are connected to the grid, a two-layer fuzzy control strategy is proposed for the participation of the energy storage battery system in FM.

In the conventional DC microgrid energy management strategy, to maximize the use of PV power, the PV power generation unit is often set in MPPT mode without considering the energy storage unit"s charging and discharging power limit, which can lead to overcharging of some energy storage devices. In the long run, it will significantly shorten the life of the energy ...

In the present work, we propose a type-II fuzzy cascade controller that will be run in every electric vehicle following a decentralized approach when it is plugged. In the first ...

Abstract: This paper presents an efficient fuzzy logic control system for charging and discharging of the battery energy storage system in microgrid applications. Energy storage system can store energy during the

off-peak hour and supply energy during peak hours in order to maintain the energy balance between the storage and microgrid. However ...

In the MS-FESS, the control of charging process could affect its conversion efficiency from electrical energy to mechanical energy, and the control of discharging process determine its steady-state precision of output voltage. Therefore, a good control method for the charging and discharging processes of MS-FESS is critical for its enhancement of storage ...

The rest of the paper is organized as follows: In Section 2, we present the scheduling problem formulation of the EV charging and discharging activities.Section 3 presents a case study, illustrating the application of the proposed methodology to a parking lot scenario. Section 4 describes the utilization of metaheuristic algorithms for optimizing EV charging and ...

Hybrid Energy Storage Multi-Fuzzy Control Power Secondary Distribution Strategy. Variations in installed capacity, aging, and manufacturing processes often lead to discrepancies in the initial SOC and capacity among HESS. During the charging and discharging process, differences in charge and discharge rates result in some energy storage units ...

In order to improve the power system reliability and to reduce the wind power fluctuation, Yang et al. designed a fuzzy control strategy to control the energy storage charging and discharging, and keep the state of charge (SOC) of the battery energy storage system within the ideal range, from 10% to 90% [44]. When the SOC is close to its limits ...

Web: https://nakhsolarandelectric.co.za