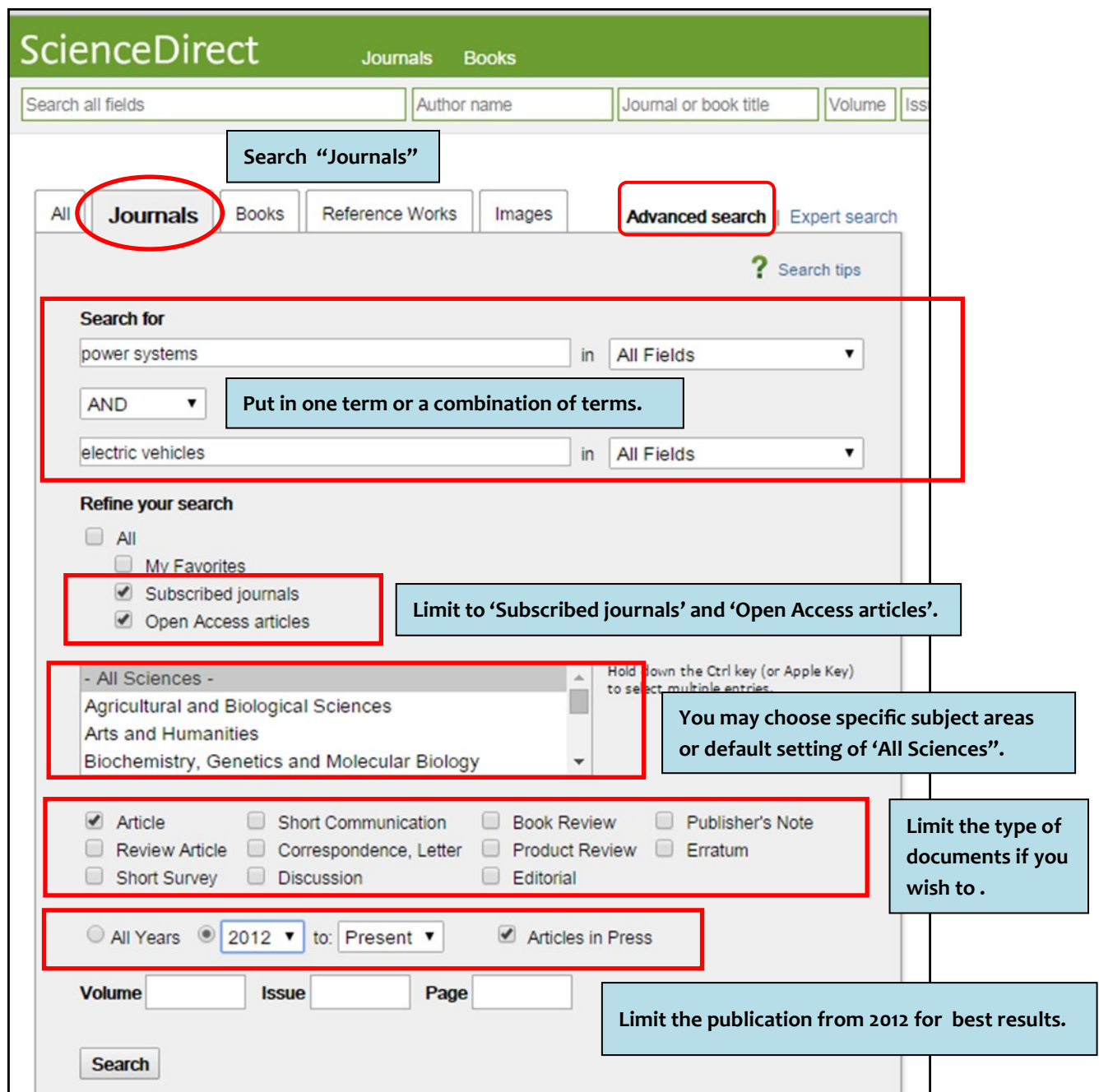


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- Advanced search button:** Located next to the Expert search option.
- Search for section:** Contains two search input fields. The first contains "power systems" and the second contains "electric vehicles". A dropdown menu is set to "All Fields". A callout box says: "Put in one term or a combination of terms."
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Abstract PDF (2792 K)
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Applied Energy, Volume 156, 15 October 2015, Pages 185-196
Wolf-Peter Schill, Clemens Gerbaulet
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- Coordinated charging of plug-in hybrid electric vehicles in smart hybrid AC/DC distribution systems Original Research Article
Renewable Energy, Volume 82, October 2015, Pages 92-99
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Highlights
Abstract
Keywords
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2. Problem description
3. Modeling
4. Mathematical formulation
5. Test results and discussion
6. Conclusions
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Figures and tables

Coordinated charging of plug-in hybrid electric vehicles in smart hybrid AC/DC distribution systems
M.F. Shaaban, A.A. Eajal, E.F. El-Saadany
doi:10.1016/j.renene.2014.09.012 Get rights and content

Highlights

- We model a hybrid AC/DC distribution system with smart coordination scheme for plug-in electric vehicles.
- We develop a real-time smart coordination scheme for plug-in electric vehicles.

Abstract

This paper introduces an online coordination approach for plug-in hybrid electric vehicles (PHEVs) charging in smart hybrid AC/DC distribution systems. The goal of the proposed method is to optimally charge the PHEVs in order to maximize the PHEV owners' satisfaction without violating the network constraints. The charging costs, which

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Coordinated charging of plug-in hybrid electric vehicles in smart hybrid AC/DC distribution systems

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ABSTRACT

This paper introduces an online coordination approach for plug-in hybrid electric vehicles (PHEVs) charging in smart hybrid AC/DC distribution systems. The goal of the proposed method is to optimally charge the PHEVs in order to maximize the PHEV owners' satisfaction without violating the network constraints. The charging costs, which represent the PHEV owners' satisfaction in this work, are based on real-time pricing. The proposed approach includes consideration of PHEV owners' requirements, PHEV batteries' characteristics, and hybrid distribution system limitations. Moreover, a sliding window concept is introduced to facilitate managing the PHEV charging and the system interlinking converters in real-time. A 38-bus test system has been modified to include DC links and used to validate the developed online charging scheme. The test results clearly demonstrate the effectiveness of the proposed method. © 2014 Elsevier Ltd. All rights reserved.

1. Introduction

Over the last few decades, a growing body of evidence has shown that global temperatures are rising due to greenhouse gases, which will result in severe climate changes and rises in sea levels. Such predictions have made the reduction of gas emissions a vital necessity, and governments around the globe are taking action to minimize their emissions. A key component in the reduction of CO₂ emissions is to shift to low- or zero-emission vehicles for transportation. To this end, the electrification of vehicles has become the best option for reducing transportation emissions, given that the electric power system is best positioned to provide the requisite infrastructure for these vehicles.

Concerns about emissions coupled with developments in electric vehicle technology have led to the expectation that electric vehicles numbers will rise rapidly over the next few decades. This will result in reductions in emissions and fuel consumption, as well as an increase in energy security by exploiting diverse energy sources [1]. If the plug-in hybrid electric vehicle (PHEV) charging is not managed properly, its extra load may lead to negative impacts, such as voltage limits violation, voltage imbalance, feeders' limits violation, and fuses blowouts [2]. This is due to the fact that the distribution system was not originally designed to accommodate such extra load and to the expectation that PHEVs will likely be clustered in specific geographical areas.

Two categories of solutions have been proposed in the literature as a means of facilitating the PHEV charging. The first focuses on upgrading the grid infrastructure or deploying distributed generation (DG) to meet the excess power demand [3]. The second category, which is addressed in this paper, focuses on utilizing the two-way communication infrastructure of the smart grid to coordinate the PHEV charging by shifting the excess power demand to optimal periods during the day [4]. However, the second solution is known to be more beneficial for both the PHEV owners and the utilities [5].

1.1. Background

The PHEV, as defined by the IEEE, is any hybrid electric vehicle (HEV) that has: (1) a battery storage bank of 4 kWh or more; (2) a rechargeable battery system that can be charged from an external energy source; and (3) the capability of driving at least 10 miles

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on Renewable Energy: Generation and Applications (ICREGA 2014)

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Saadany²

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