

Cybernetics and Systems >
An International Journal
Volume 37, 2006 - [Issue 4](#)

70 Views | 5 CrossRef citations to date | 0 Altmetric

Original Articles


NONLINEAR ROBUST CONTROL FOR PARALLEL AC/DC TRANSMISSION SYSTEMS: A NEW ADAPTIVE BACK-STEPPING APPROACH

Jun Fu  & Jun Zhao

Pages 347-359 | Published online: 01 Sep 2006

 Cite this article  <https://doi.org/10.1080/01969720600626360>

Sample our
Engineering & Technology
Journals
>> [Sign in here](#) to start your access
to the latest two volumes for 14 days

 Full Article  Figures & data  References  Citations  Metrics

 Reprints & Permissions [Read this article](#) [Share](#)

ABSTRACT

By utilizing the controllability of High Voltage Direct Current (HVDC), which means that the power delivered can be modulated, to improve the stability and operation performances of the parallel AC/DC transmission system, a new adaptive back-stepping approach for this system is developed. Compared with the existing controller based on “classical” adaptive back-stepping, the approach does not follow the classical certainty-equivalence principle. We introduce this approach, for the first time, into parallel AC/DC systems containing unknown parameters and present a novel parameter estimator and dynamics feedback controller. Besides the preserving useful nonlinearities and the real-time estimation of uncertainty parameter, the proposed approach possesses better

performances with respect to the response of the system and the speed of adaptation. Simulation results demonstrate that the proposed approach is better than the design based on “classical” adaptive back-stepping in terms of properties of stability and parameter estimation and that it recovers the performance of the “full-information” controller, which is obtained by assuming that the parameters are known and apply standard back-stepping, hence it will be an alternative to practice engineering and applications.

This article was supported by the National Natural Science Foundation of China under Grants 60574013 and 60274009, the Specialized Research Fund for the Doctoral Program of Higher Education of China under Grant 20020145007, and the Natural Science Foundation of Liaoning Province under Grant 20032020.

Related research

Recommended articles

Cited by
5

[Observer-based robust adaptive neural control for nonlinear multi-agent systems with quantised input](#) >

Xing-Yu Zhang et al.
International Journal of Systems Science
Published online: 18 Jan 2024

[Enhancing robust control of DC-DC converters: adaptive super twisting control based on barrier function](#) >

G. Indira Kishore et al.
International Journal of Electronics
Published online: 25 Sep 2025

[Event-triggered adaptive robust fault-tolerant control for a class of uncertain switched nonlinear systems](#) >

Dong-Mei Li et al.
Automatika
Published online: 21 Jul 2023

Information for

- [Authors](#)
- [R&D professionals](#)
- [Editors](#)
- [Librarians](#)
- [Societies](#)

Opportunities

- [Reprints and e-prints](#)
- [Advertising solutions](#)
- [Accelerated publication](#)
- [Corporate access solutions](#)

Open access

- [Overview](#)
- [Open journals](#)
- [Open Select](#)
- [Dove Medical Press](#)
- [F1000Research](#)

Help and information

- [Help and contact](#)
- [Newsroom](#)
- [All journals](#)
- [Books](#)

Keep up to date

Register to receive personalised research and resources by email

 [Sign me up](#)



Copyright © 2026 Informa UK Limited [Privacy policy](#)

[Cookies](#) [Terms & conditions](#) [Accessibility](#)

Registered in England & Wales No. 01072954
5 Howick Place | London | SW1P 1WG