

Multistability and hidden attractors in a relay system with hysteresis - DTU Orbit

(08/11/2017)

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For nonlinear dynamic systems with switching control, the concept of a "hidden attractor" naturally applies to a stable dynamic state that either (1) coexists with the stable switching cycle or (2), if the switching cycle is unstable, has a basin of attraction that does not intersect with the neighborhood of that cycle. We show how the equilibrium point of a relay system disappears in a boundary-equilibrium bifurcation as the system enters the region of autonomous switching dynamics and demonstrate experimentally how a relay system can exhibit large amplitude chaotic oscillations at high values of the supply voltage. By investigating a four-dimensional model of the experimental relay system we finally show how a variety of hidden periodic, quasiperiodic and chaotic attractors arise, transform and disappear through different bifurcations. (C) 2015 Elsevier B.V. All rights reserved.

General information

State: Published

Organisations: Department of Physics, Southwest State University, Belgorod State Technological University

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Number of pages: 10

Pages: 6-15

Publication date: 2015

Main Research Area: Technical/natural sciences

Publication information

Journal: Physica D: Nonlinear Phenomena

Volume: 306

ISSN (Print): 0167-2789

Ratings:

BFI (2017): BFI-level 1

Web of Science (2017): Indexed yes

BFI (2016): BFI-level 1

Scopus rating (2016): SJR 0.845 SNIP 1.266 CiteScore 1.71

Web of Science (2016): Indexed yes

BFI (2015): BFI-level 1

Scopus rating (2015): SJR 1.035 SNIP 1.312 CiteScore 1.79

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 1

Scopus rating (2014): SJR 1.067 SNIP 1.204 CiteScore 1.71

Web of Science (2014): Indexed yes

BFI (2013): BFI-level 1

Scopus rating (2013): SJR 1.029 SNIP 1.364 CiteScore 1.76

ISI indexed (2013): ISI indexed yes

BFI (2012): BFI-level 1

Scopus rating (2012): SJR 1.067 SNIP 1.234 CiteScore 1.69

ISI indexed (2012): ISI indexed yes

Web of Science (2012): Indexed yes

BFI (2011): BFI-level 1

Scopus rating (2011): SJR 0.959 SNIP 1.144 CiteScore 1.58

ISI indexed (2011): ISI indexed yes

BFI (2010): BFI-level 1

Scopus rating (2010): SJR 1.037 SNIP 1.11

Web of Science (2010): Indexed yes

BFI (2009): BFI-level 1

Scopus rating (2009): SJR 1.009 SNIP 1.133

Web of Science (2009): Indexed yes

BFI (2008): BFI-level 1

Scopus rating (2008): SJR 1.275 SNIP 1.224

Web of Science (2008): Indexed yes

Scopus rating (2007): SJR 1.339 SNIP 1.276

Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.058 SNIP 1.147
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.271 SNIP 1.261
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.975 SNIP 1.117
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.196 SNIP 1.455
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.861 SNIP 1.256
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.952 SNIP 1.244
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 1.514 SNIP 1.271
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 1.272 SNIP 1.089
Original language: English
Multistability, Hidden attractor, Power electronic converter, Relay control system, Hysteresis
DOIs:
10.1016/j.physd.2015.05.005
Source: FindIt
Source-ID: 2265851371
Publication: Research - peer-review › Journal article – Annual report year: 2015