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### Multiple bifurcations in a harmonic oscillator with delayed feedback

Cao, Jianzhi; Yuan, Rong. **Neurocomputing** 122 : 172-180. Elsevier. (Dec 25, 2013)

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#### Abstract (summary) [Translate](#)

In this paper, we consider a harmonic oscillator with delayed feedback. By studying the distribution of the eigenvalues of the characteristic equation, we drive the critical values where Bogdanov-Takens (B-T) bifurcation and zero-Hopf bifurcation occur. The versal unfoldings of the normal forms at the singularity of B-T and a pure imaginary and a zero eigenvalue singularity are given, respectively. Some numerical simulations verify the theoretical results. © 2013.

#### Indexing (details) [Cite](#)

<b>Subject</b>	Hopf bifurcation (major); Eigenvalues and eigenfunctions; Oscillators (mechanical)
<b>Classification</b>	601.1: Mechanical Devices; 921: Applied Mathematics; 921.1: Algebra; 931: Applied Physics Generally
<b>Identifier (keyword)</b>	Bogdanov-Takens bifurcations, Characteristic equation, Critical value, Delayed, Delayed feedback, Harmonic oscillators, Multiple bifurcations, Zero-Hopf bifurcations, Bogdanov-Takens bifurcation, Harmonic oscillator, Zero-Hopf bifurcation
<b>Title</b>	Multiple bifurcations in a harmonic oscillator with delayed feedback
<b>Author</b>	Cao, Jianzhi <sup>1</sup> ; Yuan, Rong <sup>1</sup>
<b>Language</b>	English
<b>Language of abstract</b>	English
<b>Document type</b>	Article
<b>Publication title</b>	Neurocomputing
<b>Volume</b>	122
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<b>Database</b>	Ei Compendex® (1800 - current)

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## Search fields

Field Name	Field Code	Example	Description and Notes
Abstract	AB	ab("zero-Hopf bifurcation")	Use adjacency and/or Boolean operators to narrow search results.
Abstract present	ABANY	"numerical simulations" AND abany(yes)	Add: <i>AND ABANY(YES)</i> to a query to limit retrieval to records with abstracts.
Accession number	AN	an(20133816768743)	A unique document identification number assigned by the information provider.
All Fields	ALL	all("harmonic oscillator" N/1 "delayed feedback")	Searches all fields in bibliographic files. Use adjacency and/or Boolean operators to narrow search results.
All fields + text	--	"harmonic oscillator" N/1 "delayed feedback"	Same as ALL field code. Searches all fields in bibliographic files.
Author <sup>1</sup>	AU	au("cao, jianzhi")	Includes all Authors.
Author First Name	AUFN	aufn(jianzhi)	
Author Last Name	AULN	auln(cao)	
First author	FAU	fau(rong, yuan)	First name listed in Author field. It is included in Author browse, but its position cannot be specified in the Author browse.
Author affiliation	AF	af(beijing normal university) af(france)	Displays in Correspondence author field. Includes as much data as is available in the original document, such as department, organization, address, city, state, country, author email, etc.
Classification <sup>1</sup>	CC,CL	cc("mechanical devices") cl(601.1)	An alternative to CMDXCC for cross-file searching.  Not available in pre-1970 data.
Compendex classification	CMDXCC	cmdxcc(applied mathematics)	Displays in Classification field.  Not available in pre-1970 data.
CODEN	CODEN	coden(nrcge)	
Conference	CF	cf("2011 aaai workshop")	Includes conference name.
Conference event start date	ESDT, CDT	esdt(2011-08-07)	
Conference event end date	EVDT	evdt(2011-08-07)	
Conference location	CG	cg("columbus oh") cg("vancouver bc")	

Field Name	Field Code	Example	Description and Notes
Conference sponsor	CS	cs(boeing) cs("northrop grumman")	Not available in pre-1970 data.
Country	CNT	cnt(netherlands)	Contains conference country. Not available in pre-1970 data.
Date created	DCRE	dcre(2013-09-03)	The date on which Elsevier created the record. Not available in pre-1970 data.
DOI	DOI	doi(10.1080/01431161.2011.566287 )	Search the portion of the DOI that comes after <a href="http://dx.doi.org/">http://dx.doi.org/</a> . Not available in pre-1970 data.
Document status	DSTAT	dstat(new)	
Document title	TI	ti(harmonic oscillator)	Includes Title, Alternate Title, Original Title, and Subtitle but not Publication Title (PUB).
Title only	TIO	tio(Wasseranalytik)	Searches only the Title, not Subtitle or Alternate Title.
Alternate title	OTI	oti(DATENVERARBEITUNG)	Includes Alternate title, Subtitle, and Original-language title if available.
Document type	DTYPE	dtype(article) dtype("conference paper")	
First available	FAV	fav(2013-09-30)	Indicates the first time a document was loaded in a specific database on Dialog. It will not change regardless of how many times the record is subsequently reloaded, as long as the accession number does not change.
From database <sup>2</sup>	FDB	"lignocellulosic biofuels" AND fdb(eicompendex) "lignocellulosic biofuels" AND fdb(10000131)	Useful in multifile searches to isolate records from a single file. FDB cannot be searched on its own; specify at least one search term then AND it with FDB.
ISBN	ISBN	isbn(0030099927) OR isbn(9780030099922)	Also searchable via the Look Up Citation tool. Not available in pre-1970 data.
Identifier (keyword)	IF	if("characteristic equation")	Not available in pre-1970 data.
ISSN	ISSN	issn(0925-2312) issn(09252312)	Also searchable via the Look Up Citation tool. Not available in pre-1970 data.

Field Name	Field Code	Example	Description and Notes
Issue	ISS	iss(12)	
Language	LA	la(french)	The language in which the document was originally published.
Language of abstract	SL	sl(english)	
Major subject	MJSUB	mjsub(hopf bifurcation)	
Pagination	PG	pg(172-180)	The start page is searchable on the Look Up Citation page.
Inventor	INV	inv(takagi, h)	
Patent application date	PAD	pad(1965-09-28)	
Patent assignee	AP	ap("sakai chemical industry co")	
Patent publication date	PDA	pda(19690617)	
Patent publication number	PN	pn(3450585)	
Patent publication country	PC	pc(gb) pc(us)	
Publication date	PD	pd(20081001) pd(>=20110415) pd(20100101-20101231)	Date range searching is supported.
Publication title <sup>1</sup>	PUB	pub(neurocomputing)	Publication title including full and abbreviated form of Journal name.
Publication year	YR	yr(2007) yr(2011-2012) yr(<2009)	Date range searching is supported.
Publisher	PB	pb("taylor and francis")	
Publisher city	PBCITY	pbcity(london) pbcity(abingdon oxfordshire)	
Place of publication	CP	cp(china)	Country of publication.
Source information	SRC	src("radiation physics and chemistry") AND yr(2011)	
Subject <sup>1</sup>	SU	su(oscillators (mechanical))	Includes Subject and Identifier (keyword).
Field Name	Field Code	Example	Description and Notes

Main subject	SUBT	subt("eigenvalues")	SUBT searches terms from the Subject display field only. Terms selected from the Subject filter use the SUBT field code.
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Volume of publication	VO	vo(122)	Also searchable via the Look Up Citation tool.

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