

Henry, D.; Martin, C. I.

Stratified equatorial flows in cylindrical coordinates. (English) Zbl 1447.35329
Nonlinearity 33, No. 8, 3889-3904 (2020).

MSC:

35Q86 PDEs in connection with geophysics
35Q31 Euler equations
35Q35 PDEs in connection with fluid mechanics
86A05 Hydrology, hydrography, oceanography
76U60 Geophysical flows
76B70 Stratification effects in inviscid fluids
76E20 Stability and instability of geophysical and astrophysical flows
35R35 Free boundary problems for PDEs
35A01 Existence problems for PDEs: global existence, local existence, non-existence

Cited in 1 Document

Keywords:

azimuthal flows; general density; cylindrical coordinates; Coriolis force; short-wavelength perturbations

Full Text: [DOI](#)

References:

- [1] Bayly B J 1987 Three-dimensional instabilities in quasi-two dimensional inviscid flows Nonlinear Wave Interactions in Fluids ed Miksad ed R W et al (New York: ASME) pp 71-7
- [2] Chu J and Escher J 2019 Steady periodic equatorial water waves with vorticity Discrete Continuous Dyn. Syst. - Ser. A 39 4713-29 · [Zbl 1415.76062](#) · [doi:10.3934/dcds.2019191](#)
- [3] Chu J, Ionescu-Kruse D and Yang Y 2019 Exact solution and instability for geophysical waves at arbitrary latitude Discrete Continuous Dyn. Syst. - Ser. A 39 4399-414 · [Zbl 1419.37075](#) · [doi:10.3934/dcds.2019178](#)
- [4] Chu J, Ionescu-Kruse D and Yang Y 2019 Exact solution and instability for geophysical waves with centripetal forces and at arbitrary latitude J. Math. Fluid Mech. 21 16 · [Zbl 1411.86002](#) · [doi:10.1007/s00021-019-0423-8](#)
- [5] Constantin A 2012 An exact solution for equatorially trapped waves J. Geophys. Res.: Oceans 117 C05029 · [doi:10.1029/2012jc007879](#)
- [6] Constantin A 2013 Some three-dimensional nonlinear equatorial flows J. Phys. Oceanogr. 43 165-75 · [doi:10.1175/jpo-d-12-062.1](#)
- [7] Constantin A and Germain P 2013 Instability of some equatorially trapped waves J. Geophys. Res.: Oceans 118 2802-10 · [doi:10.1002/jgrc.20219](#)
- [8] Constantin A 2014 Some nonlinear, equatorially trapped, nonhydrostatic internal geophysical waves J. Phys. Oceanogr. 44 781-9 · [doi:10.1175/jpo-d-13-0174.1](#)
- [9] Constantin A and Johnson R S 2015 The dynamics of waves interacting with the equatorial undercurrent Geophys. Astrophys. Fluid Dyn. 109 311-58 · [doi:10.1080/03091929.2015.1066785](#)
- [10] Constantin A and Johnson R S 2016 An exact, steady, purely azimuthal equatorial flow with a free surface J. Phys. Oceanogr. 46 1935-45 · [doi:10.1175/jpo-d-15-0205.1](#)
- [11] Constantin A and Johnson R S 2016 An exact, steady, purely azimuthal flow as a model for the Antarctic circumpolar current J. Phys. Oceanogr. 46 3585-94 · [doi:10.1175/jpo-d-16-0121.1](#)
- [12] Constantin A and Johnson R S 2017 A nonlinear, three-dimensional model for ocean flows, motivated by some observations of the Pacific equatorial undercurrent and thermocline Phys. Fluids 29 056604 · [doi:10.1063/1.4984001](#)
- [13] Constantin A and Johnson R S 2017 Large gyres as a shallow-water asymptotic solution of Euler's equation in spherical coordinates Proc. R. Soc. A 473 20170063 · [Zbl 1404.86015](#) · [doi:10.1098/rspa.2017.0063](#)
- [14] Constantin A and Monismith S 2017 Gerstner waves in the presence of mean currents and rotation J. Fluid Mech. 820 511-28 · [Zbl 1387.86009](#) · [doi:10.1017/jfm.2017.223](#)
- [15] Constantin A and Johnson R S 2019 Large-scale oceanic currents as shallow-water asymptotic solutions of the Navier-Stokes equation in rotating spherical coordinates Deep Sea Res., Part II 160 32-40 · [doi:10.1016/j.dsr2.2018.12.007](#)
- [16] Fan L and Gao H 2017 Instability of equatorial edge waves in the background flow Proc. Am. Math. Soc. 145 765-78 · [Zbl 1355.35182](#) · [doi:10.1090/proc/13308](#)
- [17] Friedlander S and Vishik M M 1991 Instability criteria for the flow of an inviscid incompressible fluid Phys. Rev. Lett. 66

2204-6 · Zbl 0968.76543 · doi:10.1103/physrevlett.66.2204

- [18] Garrison T S 2009 Essentials of Oceanography, Cengage Learning (Belmont, CA: Brooks/Cole)
- [19] Genoud F and Henry D 2014 Instability of equatorial water waves with an underlying current J. Math. Fluid Mech.16 661-7 · Zbl 1308.76035 · doi:10.1007/s00021-014-0175-4
- [20] Gill A 1982 Atmosphere-Ocean Dynamics (New York: Academic)
- [21] Henry D 2013 An exact solution for equatorial geophysical water waves with an underlying current Eur. J. Mech. B Fluid38 18-21 · Zbl 1297.86002 · doi:10.1016/j.euromechflu.2012.10.001
- [22] Henry D 2016 Equatorially trapped nonlinear water waves in a β -plane approximation with centripetal forces J. Fluid Mech.804 · Zbl 1454.76024 · doi:10.1017/jfm.2016.544
- [23] Henry D 2018 On three-dimensional Gerstner-like equatorial water waves Philos. Trans. R. Soc., A 376 20170088 · Zbl 1404.76040 · doi:10.1098/rsta.2017.0088
- [24] Henry D and Hsu H-C 2015 Instability of equatorial waves in the f-plane Discrete Continuous Dyn. Syst. - Ser. A 35 909-16 · Zbl 1304.35698 · doi:10.3934/dcds.2015.35.909
- [25] Henry D and Hsu H-C 2015 Instability of internal equatorial water waves J. Differ. Equ.258 1015-24 · Zbl 1446.76081 · doi:10.1016/j.jde.2014.08.019
- [26] Henry D and Martin C I 2018 Exact, purely azimuthal stratified equatorial flows in cylindrical coordinates Dynam. Part. Differ. Equ.15 337-49 · Zbl 1406.35251 · doi:10.4310/dpde.2018.v15.n4.a4
- [27] Henry D and Martin C-I 2019 Free-surface, purely azimuthal equatorial flows in spherical coordinates with stratification J. Differ. Equ.266 6788-808 · Zbl 1412.35241 · doi:10.1016/j.jde.2018.11.017
- [28] Henry D and Martin C-I 2019 Exact, free-surface equatorial flows with general stratification in spherical coordinates Arch. Ration. Mech. Anal.233 497-512 · Zbl 1417.35203 · doi:10.1007/s00205-019-01362-z
- [29] Hsu H-C 2015 An exact solution for equatorial waves Monatsh. Math.176 143-52 · Zbl 1304.76011 · doi:10.1007/s00605-014-0618-2
- [30] Hsu H-C and Martin C I 2017 On the existence of solutions and the pressure function related to the Antarctic circumpolar current Nonlinear Anal.155 285-93 · Zbl 1368.35214 · doi:10.1016/j.na.2017.02.021
- [31] Ionescu-Kruse D 2016 Instability of equatorially trapped waves in stratified water Ann. Mat. Pura Appl.195 585-99 · Zbl 1352.35191 · doi:10.1007/s10231-015-0479-x
- [32] Ionescu-Kruse D 2018 On the short-wavelength stabilities of some geophysical flows Philos. Trans. R. Soc., A 376 20170090 · Zbl 1404.76290 · doi:10.1098/rsta.2017.0090
- [33] Ionescu-Kruse D and Martin C I 2018 Local Stability for an exact steady purely azimuthal equatorial flow J. Math. Fluid Mech.20 27-34 · Zbl 1394.76020 · doi:10.1007/s00021-016-0311-4
- [34] Ionescu-Kruse D 2018 Local stability for an exact steady purely azimuthal flow which models the Antarctic circumpolar current J. Math. Fluid Mech.20 569-79 · Zbl 1458.76045 · doi:10.1007/s00021-017-0335-4
- [35] Johnson R S 2018 Application of the ideas and techniques of classical fluid mechanics to some problems in physical oceanography Philos. Trans. R. Soc., A 376 20170092 · Zbl 1404.86018 · doi:10.1098/rsta.2017.0092
- [36] Kessler W S and McPhaden M J 1995 Oceanic equatorial waves and the 1991-93 El Niño J. Clim.8 1757-74 · doi:10.1175/1520-0442(1995)008<1757:owate>2.0.co;2
- [37] Lifschitz A and Hameiri E 1991 Local stability conditions in fluid dynamics Phys. Fluids3 2644-51 · Zbl 0746.76050 · doi:10.1063/1.858153
- [38] Marshall J and Plumb R A 2016 Atmosphere, Ocean and Climate Dynamics: An Introductory Text (New York: Academic)
- [39] Martin C I 2014 Equatorial wind waves with capillary effects and stagnation points Nonlinear Anal. Theory Methods Appl.96 1-17 · Zbl 1283.35146 · doi:10.1016/j.na.2013.10.025
- [40] Martin C I 2017 On the existence of free-surface azimuthal equatorial flows Appl. Anal.96 1207-14 · Zbl 1368.35215 · doi:10.1080/00036811.2016.1180370
- [41] Martin C I 2018 On periodic geophysical water flows with discontinuous vorticity in the equatorial f-plane approximation Philos. Trans. R. Soc., A 376 20170096 · Zbl 1404.76048 · doi:10.1098/rsta.2017.0096
- [42] Martin C I and Quirchmayr R 2019 Explicit and exact solutions concerning the Antarctic circumpolar current with variable density in spherical coordinates J. Math. Phys.60 101505 · Zbl 1427.76076 · doi:10.1063/1.5120627
- [43] Marynets K 2019 Study of a nonlinear boundary-value problem of geophysical relevance Discrete Continuous Dyn. Syst. - Ser. A 39 4771-81 · Zbl 1418.34051 · doi:10.3934/dcds.2019194
- [44] Matioc A-V and Matioc B-V 2012 On periodic water waves with Coriolis effects and isobaric streamlines J. Nonlinear Math. Phys.19 1240009 · Zbl 1362.76016 · doi:10.1142/s1402925112400098
- [45] Matioc A-V 2012 An exact solution for geophysical equatorial edge waves over a sloping beach J. Phys. A: Math. Theor.45 365501 · Zbl 1339.86001 · doi:10.1088/1751-8113/45/36/365501
- [46] Matioc A-V 2012 An explicit solution for deep water waves with Coriolis effects J. Nonlinear Math. Phys.19 1240005 · Zbl 1362.76015 · doi:10.1142/s1402925112400050
- [47] Matioc A-V 2013 Exact geophysical waves in stratified fluids Appl. Anal.92 2254-61 · Zbl 1292.76018 · doi:10.1080/00036811.2012.727987
- [48] McCreary J P 1985 Modeling equatorial ocean circulation Annu. Rev. Fluid Mech.17 359-409 · Zbl 0596.76115 · doi:10.1146/annurev.fl.17.010185.002
- [49] Talley L, Pickard G, Emery W and Swift J 2011 Descriptive Physical Oceanography: An Introduction (New York: Academic)

[doi:10.1016/B978-0-7506-4552-2.10001-0](https://doi.org/10.1016/B978-0-7506-4552-2.10001-0)

- [50] Vallis G 2017 Atmospheric and Oceanic Fluid Dynamics: Fundamentals and Large-Scale Circulation (Cambridge: Cambridge University Press) · Zbl 1374.86002 · [doi:10.1017/9781107588417](https://doi.org/10.1017/9781107588417)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.