

Roberta De Luca

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WORKING POSITION

September, 2011-today, Post-Doc at Department of Mathematics and Applications “Renato Caccioppoli” (University of Naples Federico II). Topic title: “Sistemi Dinamici non autonomi” (SSD. MAT/07). (Scientific Advisor: Prof. Florinda Capone)

EDUCATION

- February, 2, 2011: PhD in Mathematical Sciences (University of Naples Federico II). Thesis: “*Nonlinear stability of nonautonomous Lotka-Volterra models*”. Scientific Advisor: Prof. Salvatore Rionero;
- July, 18, 2007: Master Degree in Mathematics (University of Naples Federico II). Thesis: “*Il modello di FitzHugh-Nagumo per la trasmissione di impulsi nervosi*” Scientific Advisor: Prof. Salvatore Rionero. 110/110 cum laude;
- October, 19, 2005: Bachelor Degree in Mathematics (University of Naples Federico II). Thesis: “*Principi variazionali del moto di un punto*”. Scientific Advisor: Prof. Salvatore Rionero. 110/110 cum laude;

RESEARCH PROJECTS

- Scientific Director of “Progetto Giovani G.N.F.M. 2013”. Title: “Moti fluidi di miscele in strati porosi, immersi in campi termici non isotermi”.
- Member of “Progetto di Ricerca Programma F.A.R.O. (Finanziamenti per l’avvio di ricerche originali, III tornata) “Controllo e stabilità di Processi diffusivi nell’Ambiente”, “Polo delle Scienze e Tecnologie, University of Naples “Federico II”. Project time: April 2012-October 2013. Scientific Director: Prof. Florinda Capone.
- Member of “Progetto Giovani G.N.F.M. 2015: Dinamica dei sistemi complessi infinito dimensionali con applicazioni in Fluidodinamica, Economia e Biologia”. Scientific Director: Dott. Isabella Torricollo.

MEMBERSHIPS

- Member of “Gruppo Nazionale per la Fisica Matematica (G.N.F.M.)” of “Istituto di Alta Matematica “Francesco Severi” (INdAM)” since January 2008;
- Member of “Unione Matematica Italiana” (UMI) since January 2015.

TEACHING SUPPORT

- From January 2008 to February 2011, teaching support for the following courses at University of Naples Federico II:
 - i) “Matematica” (Corso di Laurea in Biologia), Prof. E. Sansone.From 2008-now teaching support for
 - ii) “Matematica” (Corso di Laurea in Biologia). Prof. M. Gentile.

iii) “Fisica Matematica” (Corso di Laurea in Matematica). Prof.ssa F. Capone;

From October 2010 to July 2012 teaching support for

iv) “Fisica Matematica” (Corso di Laurea in Ingegneria Meccanica). Prof. M. De Angelis.

From October 2012-now teaching support for

v) “Meccanica Razionale” (Corso di Laurea in Ingegneria Edile). Prof. F. Capone.

- From September to December 2010 collaborator assignment for “Supporto didattico al Corso di Fisica Matematica (MAT/07) per l’Ingegneria Meccanica” in Protocollo Attuativo tra l’Ateneo Federico II (Facoltà di Ingegneria) and Società FIREMA S.p.A., Ansaldo Breda S.p.A. and l’Unione Industriali di Napoli.
- From July to August, 2011 teaching assignment for “Corso di preparazione per l’accesso alle facoltà a numero programmato, da parte del Centro di Ateneo per l’Orientamento, la Formazione e la Teledidattica (SOFTel)”.

SCHOOLS AND CONFERENCES

SCHOOLS

1. Summer school “Topics on Partial Differential Equations”, Naples, Complesso Universitario Monte S. Angelo, 11-18, June, 2008;
2. “XXXIII scuola estiva di Fisica Matematica”, Ravello, 8-20, September, 2008. Communication title: *An introduction to smectics*;
3. “XXXIV scuola estiva di Fisica Matematica”, Ravello, 14-26, September, 2009. Communication title: *Stroh formalism: Interface waves*;
4. “XXXV scuola estiva di Fisica Matematica”, Ravello, 13-25, September, 2010. Communication title: *A two-phase traffic model connected with a microscopic follow-the leader model*;
5. “XXXVIII scuola estiva di Fisica Matematica”, Ravello, 16-28, September, 2013. Communication title: *Nonlinear stability for vertical constant throughflows in porous media*;
6. “XXXIX scuola estiva di Fisica Matematica”, Ravello, 8-27, September, 2014. Communication title: *Ultimately boundedness and non linear stability for vertical flows in porous media*.

CONFERENCES

- “International Conference on New Trends in Fluid and Solid Models”, Vietri (SA) from 28-02 to 01-03, 2008. Scientific communication title: *On the nonautonomous Lotka-Volterra systems*;
- “II International Conference on New Trends in Fluid and Solid Models”, Vietri (SA), 19-21/03/2009. Scientific communication title: *New results on the stability of non autonomous generalized Lotka-Volterra systems*;
- “III International Conference on New Trends in Fluid and Solid Models”, Vietri (SA), 18-20/03/2010. Scientific communication title: *Stability of a nonautonomous system, with high nonlinearity, generalizing the Lotka-Volterra model*;
- “XVI Conference on Waves and Stability in Continuous Media” Wascom 2011, Brindisi, 12-18/06/2011. Scientific communication title: *On the asymptotic stability of predator-prey model with mutual interference*;
- “Assemblea Scientifica GNFM 2012” Montecatini, 4-6/10/2012. Scientific communication title: *Sull’insorgere della convezione in miscele triple saturanti strati porosi, in presenza di rotazione e legge di Brinkman*

- “XVII Conference on Waves and Stability in Continuous Media ” Wascom 2013, Levico Terme (TN), 17-21/06/2013. Scientific communication title: *On the non-linear stability of non constant throughflows in porous media*;
- “Assemblea Scientifica GNFM 2014” Montecatini, 15-17/05/2014;
- CICAM 7. Seventh China-Italy Colloquium on Applied Mathematics. (Palermo, Italy - September 8, 2014 - September 11, 2014). Scientific communication title: *Effect of diffusion on the stability of equilibria in a PDE system modeling Cholera epidemic*;
- “XVIII Conference on Waves and Stability in Continuous Media ” Wascom 2015, Cetraro (CS), 1-05/06/2015. Scientific communication title: *Asymptotic stability of rotating diffusive convective Navier-Stokes fluid mixture, heated from below and salted from above and below, via the Auxiliary System Method*;
- “Assemblea Scientifica GNFM 2015” Montecatini, 22-24/10/2015. Scientific communication title: *Effetto della rotazione nella convezione doppia di Bénard*.

INVITATION TO CONFERENCES

- “IV International Conference on New Trends in Fluid and Solid Models”, Vietri (SA), 4-6/04/2013. Dissertation title: *Throughflows in porous media: ultimately boundedness and nonlinear stability*;
- “Giornata della Ricerca”. Complesso Monte Sant’Angelo. Napoli. 18/06/2014. Dissertation title: “On the evolution of nonlinear reaction-diffusion systems with applications to: porous media, nonautonomous systems, SEIR and Cholera models”.
- “Current Problems in fluid-dynamics and non-equilibrium thermodynamics”. Bressanone (BZ), 18-20/12/2014. Dissertation title: “*Cold convection*” and *global nonlinear stability of throughflows in porous media*.

PUBLICATIONS

- 1) De Luca R., Rionero S., *On the Nonautonomous Lotka-Volterra Systems*. In: New Trends in Fluid and Solid Models. World Scientific, **1**, 49-55, (2009);
- 2) De Luca R., *Nonlinear stability for a class of generalized Lotka-Volterra models*, Rendiconti dell’ Accademia delle Scienze Fisiche e Matematiche di Napoli, vol LXXVII, 117-132, (2010).
- 3) De Luca R. *On the asymptotic stability of an Hassell predator-prey model with mutual interference*. Acta Applicandae Mathematica, **122**, Issue 1, 191-204, (2012).
- 4) De Luca R. *On the long-time dynamics of nonautonomous predator-prey models with mutual interference*. Ricerche di Matematica, **61**, Issue 2, 275-290, (2012).
- 5) Capone F., De Luca R. *Ultimately boundedness and stability of triply diffusive mixtures in rotating porous layers under the action of Brinkman law*. International Journal of Non-linear Mechanics, **47**, Issue 7, 799-805, (2012).
- 6) Capone F., De Luca R. *Onset of convection for ternary fluid mixtures saturating horizontal porous layers with large pores*. Rendiconti dell’Accademia dei Lincei, Vol. XXIII series IX, n.4, 405-428, (2012).
- 7) Capone F., De Luca R., Rionero S., *On the stability of non-autonomous perturbed Lotka-Volterra models*. Applied Mathematics and Computation, **219**, Issue 12, 6868-6881, (2013).
- 8) Capone F., De Luca R., Torricollo I., *Longtime behaviour of vertical throughflows for binary mixtures in porous layers*. International Journal of Non-linear Mechanics, **52**, 1-7, (2013).
- 9) Capone F., De Cataldis V., De Luca R., *On the nonlinear stability of an epidemic SEIR reaction-diffusion model*. Ricerche di Matematica **62**, Issue 1, 161-181, (2013).

- 10) Capone F., De Luca R., *On the stability-instability of vertical throughflows in double diffusive mixtures saturating rotating porous layers with large pores*. Ricerche di Matematica, Vol. 63, Issue 1, pp 119-148 (2014).
- 11) Capone F., De Cataldis V., De Luca R., Torricollo I.: *On the stability of vertical constant throughflows for binary mixtures in porous layers*. International Journal of Non-linear Mechanics, **59**, 1-8, (2014).
- 12) Capone F., De Luca R., *Global stability for a binary reaction-diffusion Lotka-Volterra model with ratio-dependent functional response*. Acta Applicandae Mathematica, **132**, 151-163 (2014);
- 13) Capone F., De Luca R., *Coincidence between linear and global nonlinear stability of non-constant throughflows via the Rionero "Auxiliary System Method"*. Meccanica, Vol. 49, Issue 9, 2025-2036, (2014).
- 14) Capone F., De Cataldis V., De Luca R., *On the stability of a SEIR reaction diffusion model for infections under Neumann boundary conditions*. Acta Applicandae Mathematica, Vol. 132, Issue 1, 165-176, (2014).
- 15) Capone F., De Cataldis V., De Luca R., *Influence of diffusion on the stability of equilibria in a reaction-diffusion system modeling Cholera dynamic*. Journal of Mathematical Biology. Vol. 71 (5), pp. 1107-1131 (2015).
- 16) De Luca R., *Global nonlinear stability and "cold convection instability" of non-constant porous throughflows, 2D in vertical planes*. Ric. Mat., Vol. 62, Issue 1, pp. 99-113 (2015);
- 17) De Luca R., Rionero S.: *Convection in multi-component rotating fluid layers via the Auxiliary System Method*. Ricerche di Matematica DOI: 10.1007/s11587-015-0251-y.
- 18) De Luca R., Rionero S.: *Steady and oscillatory convection in rotating fluid layers heated and salted from below*. International Journal of Nonlinear-Mechanics, Vol. 78, pp. 121-130 (2016).

RESEARCH INTERESTS

Research concerns asymptotic behaviour, linear and non linear stability (with respect to initial data) of solutions of O.D.Es and P.D.Es. systems with particular regard as concerns:

- 1) non-autonomous bi-dimensional Lotka-Volterra models;
- 2) Lotka-Volterra-Hassell models with mutual interference. These systems model dynamic interactions that not verify the classical autonomous Lotka-Volterra equations;
- 3) epidemiological systems modelling infectious disease transmission also when there exists an incubation period (SEIR models);
- 4) fluid motions in porous media. The onset of convection in fluid mixtures saturating horizontal porous layers is studied. The layers are supposed to be heated from below, salted by one or more salts (chemical components) either from below or above. The influence of uniform rotation around the vertical axis and of Brinkman law (holding for large pores) is considered;
- 5) onset of convection in Navier-Stokes multicomponent fluid-mixtures.

All declarations in the curriculum vitae, correspond to the truth and can be proved through documentation (Decreto del Presidente della Repubblica 445 del 28.12.2000).

Naples, 18.11.2015

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