Application

Laboratoire Européen Associé CNRS Franco-Roumain
2015

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Title of the Project: *Homogenization of a Thermal Problem with Flux Jump*

Participants

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• Claudia Timofte, Professor, Department of Theoretical Physics, Mathematics, Optics, Plasma and Lasers, Faculty of Physics, Bucharest University, Romania.

1 Brief Description of the Scientific Project

Homogenization of a Thermal Problem with Flux Jump

The goal of our project is to analyze, using homogenization techniques, the effective thermal transfer in a periodic composite material formed by two constituents, separated by an imperfect interface where both the temperature and the flux have a jump.

In the last decades, the study of the macroscopic properties of heterogeneous composite materials which exhibit imperfect contact between their constituents has been a subject of major interest for mathematicians, physicists, engineers, etc. In particular, the problem of thermal transfer in such heterogeneous media has attracted the attention of a broad category of researchers, due to the fact that the macroscopic properties of a composite can be affected by the imperfect bonding between its constitutive components. This imperfect contact can be generated by various causes: the presence of a thin interphase, chemical processes, the presence of impurities at the boundaries, the interface damage, etc.

Let Ω be an open bounded material body in $\mathbb{R}^n (n \geq 2)$, with a Lipschitz-continuous boundary $\partial\Omega$. We assume that Ω is formed by two constituents, Ω_1^ε and Ω_2^ε, representing two materials with different thermal characteristics, separated by an imperfect interface Γ^ε. We also assume that the phase Ω_1^ε is connected and reaches the external fixed boundary $\partial\Omega$ and that Ω_2^ε is not connected. Actually, Ω_2^ε is the union of domains of size ε, periodically distributed in Ω with periodicity ε (ε is a small real parameter related to the characteristic size of the two constituents).

Since the pioneering work [1], where a thermal problem in a two-component composite with interfacial barrier was studied for the first time by using asymptotic expansions, many mathe-

matical studies were performed, in order to rigorously justify the convergence results. Various mathematical methods were used: the energy method in [7], the two-scale convergence method in [4] and more recently the unfolding method for periodic homogenization in [3]. The main common point of all these studies is the fact that at the interface between the two components the flux of the temperature is continuous, the temperature field has a jump and the flux is proportional to this jump. Several cases are studied, following the order of magnitude with respect to the small parameter ε of the resistance generated by the imperfect contact between the constituents. Moreover, the case when both components are connected is studied, too.

The main novelty brought by our project consists in allowing the presence of a jump in the flux across the imperfect interface, too. Following the ideas presented in [5] and [6], we will define suitable interface conditions corresponding to our problem. More precisely, the problem that we will study is the following one:

$$\begin{cases} -\text{div } (A^\varepsilon \nabla u_1^\varepsilon) = f \quad \text{in } \Omega_1^\varepsilon, \\ -\text{div } (A^\varepsilon \nabla u_2^\varepsilon) = f \quad \text{in } \Omega_2^\varepsilon, \\ A^\varepsilon \nabla u_1^\varepsilon \cdot \nu = \varepsilon^\alpha h^\varepsilon (u_1^\varepsilon - u_2^\varepsilon) \quad \text{on } \Gamma^\varepsilon, \\ A^\varepsilon \nabla u_2^\varepsilon \cdot \nu = \varepsilon^\alpha h^\varepsilon (u_1^\varepsilon - u_2^\varepsilon) + \varepsilon^\beta g^\varepsilon \quad \text{on } \Gamma^\varepsilon, \\ u_1^\varepsilon = 0 \quad \text{on } \partial\Omega. \end{cases} \tag{1}$$

Here, α and β are real parameters, $\alpha \leq 1$, ν is the unit outward normal to Ω_2^ε, $f \in L^2(\Omega)$, h and g are positive bounded Y-periodic functions (Y being the unit cell in $\mathbb{R}^n$) and

$$h^\varepsilon(x) = h\left(\frac{x}{\varepsilon}\right), \quad g^\varepsilon(x) = g\left(\frac{x}{\varepsilon}\right) \text{ a.e. on } \Gamma^\varepsilon.$$

Also, the matrix A is supposed to be bounded, uniformly elliptic and

$$A^\varepsilon(x) = A\left(\frac{x}{\varepsilon}\right) \text{ a.e. in } \Omega.$$

Under the above hypotheses, problem (1) is well-posed.

Proving suitable energy estimates and using the unfolding operators introduced in [2] and developed in [3], we shall pass to the limit, with $\varepsilon \to 0$, in the corresponding variational formulation of problem (1) in order to get the homogenized problem. Various limit problems will be obtained, the most interesting one being the case corresponding to $\alpha = -1$ and $\beta = 1$. Corrector results will be obtained, too.

Both participants to this project already worked on problems with interfacial barriers and published independently (alone or with co-authors) a series of papers on this topic (see the articles written in bold in the lists of publications).

References

[1] J.-L. Auriault, H. Ene, "Macroscopic modelling of heat transfer in composites with interfacial thermal barrier", Int. J. of Heat and Mass Transfer, 37(18), pp. 2885-2892, 1994.

[2] D. Cioranescu, A. Damlamian, P. Donato, G. Griso, R. Zaki, "The periodic unfolding method in domains with holes", SIAM J. Math. Anal. 44, pp. 718-760, 2012.

[3] P. Donato, K.H. Le Nguyen, R. Tardieu, "The periodic unfolding method for a class of imperfect transmission problems", J. Math. Sci. 176 (6), pp. 891-927, 2011.

[4] H. Ene, D. Polisevski, "Model of diffusion in partially fissured media", Z. Angew. Math. Phys. 53(6), pp. 1052-1059, 2002.

[5] K. Fellner, V. Kovtunenko, "A singularly perturbed nonlinear Poisson-Boltzmann equation: uniform and superasymptotic expansions", preprint, 2014.

[6] E.R. Ijioma, A. Muntean, T. Ogawa, "Pattern formation in reverse smouldering combustioon: a homogenization approach", Combustion Theory and Modelling, 17(2), pp. 185-223, 2013.

[7] S. Monsurrò, "Homogenization of a two-component composite with interfacial thermal barrier", Advances in Mathematical Sciences and Applications, 13 (1), pp. 43-63, 2003.

2 Activities to be Supported by the Project

We propose two research visits, with financial support needed for travel expenses, accommodation and local expenses:

- One research visit (10 days) to Metz of Claudia Timofte, 2015.

Required financial support 1400 €, as follows:

- 400 € for travel expenses (flight, train and bus tickets)
- 1000 € for accommodation and local expenses.

- One research visit (7 days) to Bucharest of Renata Bunoiu, 2016.

Required financial support 1100 €, as follows:

- 400 € for travel expenses (flight, train and bus tickets)
- 700 € for accommodation and local expenses.

Total required financial support: $\approx$ 2500 €.

3 Curricula Vitae

Renata Bunoiu

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Position : Maître de Conférences, Université de Lorraine - Metz, since September 1998
Education

1997 PhD in Mathematics, Université de Metz (très honorable)
1994 D.E.A. de Mathématiques (mention bien), Université de Metz.

Research Interests

- Homogenization theory
- Asymptotic analysis in thin domains
- Theory of waveguides
- Spectral theory
- Scattering theory

Publications

• I. Beltiță, R. Bunoiu, "Inverse scattering for the 1-D Helmholtz equation", to appear in Complex Analysis and Operator Theory, preprint arXiv:math/0511401.

• D. Polişevski, R. Schiltz-Bunoiu, A. Stănescu, "Homogenization cases of heat transfer in structures with interfacial barriers", to appear in Bull. Math. Soc. Sci. Math. Roumanie.

• R. Bunoiu, G. Cardone, S. Nazarov, "Scalar boundary value problems on junctions of thin rods and plates. I. Asymptotic analysis and error estimates", ESAIM: Mathematical Modelling and Numerical Analysis, 48 (5), pp. 1495-1528, 2013.

• D. Borisov, R. Bunoiu, G. Cardone, "Waveguide with non-periodically alternating Dirichlet and Robin conditions: homogenization and asymptotics", Zeitschrift für angewandte Mathematik und Physik, 64 (3), pp. 439-472, 2013.

• R. Bunoiu, G. Cardone. C. Perugia, "Unfolding method for the homogenization of Bingham flow", Modelling and Simulation in Fluid Dynamics in Porous Media, J.A. Ferreira, S Barbeiro, G. Pena, M.F. Wheeler (Eds.), Springer Proceedings in Mathematics and Statistics 28, New York, pp. 107-122, 2013.

• D. Borisov, R. Bunoiu, G. Cardone, "Homogenization and asymptotics for a waveguide with an infinite number of closely located small windows", Problems in Mathematical Analysis 58. J. Math. Sci. (N. Y.), 176 (6), pp. 774-785, 2011.

• R. Bunoiu, G. Cardone, T. Suslina, "Spectral approach to homogenization of an elliptic operator periodic in some directions", Math. Methods Appl. Sci., 34 (9), pp. 1075-1096, 2011.

• D. Borisov, R. Bunoiu, G. Cardone, "On a waveguide with an infinite number of small windows", C. R. Math. Acad. Sci. Paris, 349 (1-2), pp. 53-56, 2011.

• D. Borisov, R. Bunoiu, G. Cardone, "On a waveguide with frequently alternating boundary conditions: homogenized Neumann condition", Ann. Henri Poincaré, 11 (8), pp. 1591-1627, 2010.

• D. Polişevski, R. Schiltz-Bunoiu, "Heat conduction through a first-order jump interface", New trends in continuum mechanics, M. Mihăilescu- Suliciu, pp. 225-230, Theta Ser. Adv. Math., 3, Theta, Bucharest, 2005

• D. Polişevski, R. Schiltz-Bunoiu, D. Polisevski, "Diffusion in an intermediate model of fractured porous media", Bul. Ştiinţ., Univ. Piteşti, Ser. Mat. Inf. 10, pp. 99-106, 2004.

• R. Bunoiu, S. Kesavan, "Asymptotic behaviour of a Bingham fluid in thin layers", J. Math. Anal. Appl., 293 (2), pp. 405-418, 2004.

• R. Bunoiu, S. Kesavan, "Fluide de Bingham dans une couche mince", An. Univ. Craiova Ser. Mat. Inform., 30 (1), pp. 71-77, 2003.

• R. Bunoiu, "Nonlinear viscous flow through a thin slab in the lubrication case", Rev. Roumaine Math. Pures Appl., 45 (4), pp. 577-591, 2000.

• R. Bunoiu, J. Saint Jean Paulin, "Linear flow in porous media with double periodicity", Portugaliae Mathematica, 56, pp. 221–238, 1999.

• R. Bunoiu, J. Saint Jean Paulin, "Fluide à viscosité non linéaire dans un domaine de faible épaisseur dans le cas de lubrification", C. R. Acad. Sci. Paris, 323, Série I, pp. 1097-1102, 1996.

Other publications

• R. Bunoiu, "Sur les caractéristiques hydrauliques d'un module de stockage", Rapport interne Commissariat à l'énergie atomique, 1996.

• R. Bunoiu, "Sur un problème mathématique en mécanique des fluides", Rev. de l'Assoc. Femmes et Mathématiques, 1997.

• R. Bunoiu, K. Taous, "On a thermal problem in domains with cuts", Proceedings of the conference Homogenization and applications to material sciences, September 15-19, 2001, Timişoara, Editura Universităţii de Vest, Timisoara, 2001.

Preprints

• R. Bunoiu, R. Precup, "Vectorial approach to coupled nonlinear Schrödinger systems under nonlocal Cauchy conditions" (www.becasim.math.cnrs.fr), submitted.

Claudia Timofte

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Professional address: Department of Theoretical Physics, Mathematics, Optics, Plasma and Lasers, Faculty of Physics, Bucharest University, Bucharest, P.O. Box MG-11, Romania
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Education

1996 PhD in Mathematics, IMAR, Bucharest, Romania
1988 Master of Science, Bucharest University, Faculty of Mathematics, Bucharest, Romania.

Research Interests

- Homogenization theory
- Macrotransport processes
- Probabilistic methods in fluid dynamics
- Relaxation methods for optimization problems
- Upscaling in chemical reactive processes in porous media
- Mathematical models in biology and in crystallography

Publications

Papers in Refereed Journals

- C. Timofte, "Homogenization results for the calcium dynamics in living cells", submitted, 2014.
- A. Capatina, C. Timofte, "Homogenization results for micro-contact elasticity problems", submitted, 2014.
- **H. Ene, C. Timofte, I. Tentea, "Homogenization of a thermoelasticity model for a composite with imperfect interface", Bull. Math. Soc. Sci. Math. Roumanie, 2014 (accepted).**
- **H. Ene, C. Timofte, "Microstructure models for composites with imperfect interface via the periodic unfolding method", Asymptotic Analysis, 89 (1-2), pp. 111-122, 2014.**
- A. Capatina, C. Timofte, "Boundary optimal control for quasistatic bilateral frictional contact problems", Nonlinear Analysis: Theory, Methods and Applications, 94, pp. 84–99, 2014.
- C. Timofte, "Homogenization results for ionic transport in periodic porous media", Computers and Mathematics with Applications, 68 (9), pp. 1024–1031, 2014.
- **C. Timofte, "Multiscale analysis of diffusion processes in composite media", Computers and Mathematics with Applications, 66 (9), pp. 1573-1580, 2013.**

• C. Timofte, "Multiscale modeling of heat transfer in composite materials", Rom. Journ. Phys., 58 (9-10), pp 1418–1427, 2013.

• A. Capatina, C. Timofte, "An optimal control problem governed by implicit evolution quasi-variational inequalities", Annals of the University of Bucharest, 4 (LXII), pp. 157- 166, 2013.

• A. Capatina, H. Ene, C. Timofte, "On the asymptotic behavior of elliptic problems in periodically perforated domains with mixed-type boundary conditions", Bulletin of the Transilvania University of Brasov, Series III: Mathematics, Informatics, Physics, 5(54), 2012.

• A. Capatina, H. Ene, C. Timofte, "Homogenization results for elliptic problems in periodically perforated domains with mixed-type boundary conditions", Asymptotic Analysis, 80 (1-2), pp. 45-56, 2012.

• C. Timofte, N. Cotfas, G. Pavel, "On the asymptotic behaviour of some elliptic problems in perforated domains", Romanian Reports in Physics, 64 (1), pp. 5–14, 2012.

• N. Cotfas, C. Timofte, G. Pavel, "Finite Frames and Finite Frame Quantizations", Romanian Reports in Physics, 63 (4), pp. 1026–1037, 2011.

• C. Timofte, "Multiscale analysis of composite structures", Biomath, 1, pp. 1-5, 2012.

• C. Timofte, "Homogenization results for nonlinear thermal diffusion problems in composite structures", Central European Journal of Physics, 8 (4), pp. 555-561, 2010.

• C. Timofte,"Homogenization Results for Hyperbolic-Parabolic Equations", Romanian Reports in Physics 62 (2), pp. 229-238, 2010.

• C. Timofte, "Homogenization Results for a Nonlinear Wave Equation in a Perforated Domain", U.P.B. Sci. Bull., Series A 72 (2), 2010.

• C. Timofte, "Multiscale analysis in dynamical heat transfer problems in biological tissues", Romanian Reports in Physics, 61 (2), pp. 269-280, 2009.

• B. Calmuschi-Cula, I. Kalf, C. Timofte, U. Englert, "Robust packing in cyclopalladated primary amines: isomorphous crystal structures of four complexes with varying substitution patterns", Acta Cryst. C 65, m48 - m51, 2009.

• C. Timofte, "Homogenization results for enzyme catalyzed reactions through porous media", Acta Mathematica Scientia 29B (1), pp. 74-82, 2009.

• C. Timofte, "Homogenization results for dynamical heat transfer problems in heterogeneous biological tissues", Bulletin of the Transilvania University of Brasov, 2 (51), pp. 143-148, 2009.

• C. Timofte, "Upscaling in dynamical heat transfer problems in biological tissues", Acta Physica Polonica B 39 (11), pp. 2811-2822, 2008.

• C. Timofte, "Homogenization results for climatization problems", Annali dell'Universita di Ferrara Sez. VII (N.S.), 53 (2), pp. 437-448, 2007.

• C. Timofte, "Upscaling in Nonlinear Thermal Diffusion Problems", PAMM, WILEY VCH Verlag, Volume 7, Issue 1. Published Online: Dec 12 2008.

• C. Timofte, "Upscaling in Diffusion Problems in Domains with Semipermeable Boundaries", Acta Physica Polonica B 38 (8), pp. 2433-2443, 2007.

• C. Timofte, "Upscaling of variational inequalities arising in nonlinear problems with unilateral constraints", Z. Angew. Math. Mech. 87 (6), pp. 406-412, 2007.

• C. Timofte,"On the Homogenization of a Climatization Problem", Studia Universitatis Babes-Bolyai Mathematica, 2, pp. 117-126, 2007.

• C. Timofte, "Upscaling in unilateral constraint problems", The Hyperion Scientific Journal, Seria A: Mathematics, Physics and Electrical Engineering, 2007.

• B. Calmuschi-Cula, C. Timofte, U. Englert, "(S)-[2-(1-Aminoethyl)phenyl]chloro (3-chloropyridine)palladium(II) acetone 0.25-solvate", Acta Crystallographica Section E, 62 (11), m2791-m2793, 2006.

• C. Timofte, "Homogenization Results for Enzymatic Dispersion Processes", PAMM, Volume 6, Issue 1, 515-516, Wiley-VCH, 2006, DOI: 10.1002/pamm.200610238.

• C. Timofte, "Homogenization in Nonlinear Chemical Processes in Porous Media", WSEAS Transactions on Mathematics, Vol. 5 (5), pp. 465-472, 2006.

• C. Timofte, "Upscaling in a nonlinear variational inequality arising in elasticity", WSEAS Transactions on Mathematics, Vol. 5 (12), pp. 1290-1296, 2006.

• B. Calmuschi, C. Timofte, "Upscaling of Chemical Reactive Flows in Porous Media", Analele Universitatii din Bucuresti, Mathematics Series, LV 2, pp. 145-154, 2006.

• C. Timofte, " On the Michaelis-Menten enzyme mechanism", Romanian Reports in Physics, 57 , 3, pp. 296-305, 2005.

• C. Conca, J. I. Díaz, A. Linan, C. Timofte, "Homogenization in chemical reactive flows through porous media", Electron. J. Diff. Eqns., Vol. 2004, No. 40, pp. 1-22.

• C. Timofte, "On the Homogenization of Parabolic Problems with Dynamical Boundary Conditions in Perforated Media", Romanian Reports in Physics, 56, 2, pp. 131-140, 2004.

• C. Conca, J.I. Díaz, C. Timofte, "On the homogenization of a transmission problem arising in chemistry", Romanian Reports in Physics, 56, 4, pp. 613-622, 2004.

• C. Timofte, "On the asymptotic behavior of thermal Taylor dispersion processes in periodic media", Journal of Theoretical and Applied Mechanics, 41, pp. 75-88, 2003.

• C. Conca, F. Murat, C. Timofte, "A Generalized Strange Term in Signorini's Type Problems", ESAIM: Model. Math. Anal. Numer. (M2AN) 37(5), pp. 773-806, 2003.

• C. Conca, J.I. Díaz, C. Timofte, "Effective Chemical Processes in Porous Media", Math. Models Methods Appl. Sci. (M3AS), 13 (10), pp. 1437-1462, 2003.

• C. Timofte, "Homogenization results for unilateral constraint problems", Ann. Univ. Bucharest, Physics, LII, pp. 5-11, 2003.

• C. Timofte, "Parabolic Problems with Dynamical Boundary Conditions in Perforated Media", Mathematical Modelling and Analysis, 8 (4), pp. 337-350, 2003.

• G. Buttazzo, C. Timofte, "On the relaxation of some optimal partition problems", Advances in Mathematical Sciences and Applications, 12, 2, pp. 509-520, 2002.

• C.Timofte, "A macrotransport paradigm for dispersion phenomena in periodic porous media", IJDEA, 1A, 3, pp. 313-319, 2000.

• C. Timofte, "A macrotransport paradigm for thermal Taylor dispersion processes in periodic media", Romanian Reports in Physics, 52 (5-6-7), pp. 441-446, 2000.

• C. Timofte, "Asymptotics of thermal dispersion in periodic media", Journal of Theoretical and Applied Mechanics, 37 (1), pp. 95-108, 1999.

• C. Timofte, "Application of central limit theorems to macrotransport processes", Latvian Journal of Physics and Technical Sciences, 2, pp. 24-38, 1998.

• C. Timofte, "On the asymptotic behavior of some Taylor dispersion processes in periodic media", Romanian Reports in Physics, 50 (7-8-9), pp. 681-690, 1998 .

• C. Timofte, "Thermal Taylor dispersion phenomena in discontinuous systems", Ann. Univ. Bucharest, Physics, XLVII, 1998, pp. 27-33.

• C. Timofte, "Application of central limit theorems to solute dispersion in periodic media", Ann. Univ. Bucharest, Physics, XLVI, pp. 23-31, 1997.

• C. Timofte, "Heat transport in a random cylindrical tube", Ann. Univ. Bucharest, Physics, XLV, pp. 87-96, 1996.

• C. Timofte, "A perturbation method for some random flows", Ann. Univ. Bucharest, Physics, XLIV, pp. 3-8, 1995.

• C. Timofte, "On the dispersion of a solute in some unbounded media", Ann. Univ. Bucharest, Physics, XLIII, pp. 3-8, 1994.

Papers in Proceedings of International Conferences

• C. Timofte, "On the Homogenization of a Damped Wave Equation", AIP Conference Proceedings, 1301, 2010.

• C. Timofte, "Homogenization Results for a Coupled System of Diffusion Equations in a Porous Medium", AIP Conference Proceedings, 1281, pp. 635-638, 2010.

• C. Timofte, "Homogenization Results for a Wave Equation with Interior and Boundary Damping", ICNPAA 2010, Cambridge Scientific Publishers.

• C. Timofte, "Asymptotic Analysis in Dynamical Heat Transfer Problems in Heterogeneous Periodic Media", AIP Conference Proceedings, 1186, pp. 248-258, 2009, ISBN 978-0-7354-0752-7.

• C. Timofte, "Homogenization results for dynamical heat transfer problems in biological tissues", Proceedings of Exploratory Workshop on Asymptotic Analysis and Applications in Continuum Mechanics, Brasov, August 28 - 30, 2008.

• C. Timofte, "Homogenization results for diffusion problems in composite structures", Proceedings of International Conference MCM-2008, Riga, Latvia.

• C. Timofte, "Upscaling in Reaction-Diffusion Problems", AIP Conference Proceedings, 936, pp. 547-550, Melville, New York, 2007, ISBN 978-0-7354-0447-2.

• C. Timofte, "Upscaling in Nonlinear Thermal Diffusion Problems in Composite Materials", Progress in Industrial Mathematics at ECMI 2006, Springer Series, Vol. 12, pp. 328-332, 2007, ISBN: 978-3-540-71991-5.

• C. Timofte, "Homogenization in Nonlinear Chemical Reactive Flows", Proceedings of the International Conference MATH'06, Istanbul, Turkey, pp. 250-255, 27-29 May 2006, ISSN: 1790-5117, ISSN: 1790-5117, ISBN: 960-8457-45-9.

• C. Conca, J. I. Díaz, A. Linan, C. Timofte, "On the Homogenization of a Semilinear Problem Arising in Chemistry", chapter in "Multi Scale Problems and Asymptotic Analysis", GAKUTO International Series Mathematical Sciences and Applications, Volume 24, pp. 89-103, Gakkotosho, Tokyo, Japan, 2006, ISBN 4-7625-0433-5.

• C. Timofte, "On the homogenization of a nonlinear problem arising in elasticity", Proceedings of the International Conference NOLASC'06, Bucharest, October 16-18, 2006, pp. 15-20, ISSN: 1790-5117, ISBN: 960-8457-54-8.

• C. Timofte, "Homogenization Results for Enzymatic Dispersion Processes", GAMM Annual Meeting, Berlin, Germany, 2006.

• C. Conca, J.I. Díaz, A. Linan, C.Timofte, "Homogenization in chemical reactive flows through porous media", chapter in "New trends in continuum mechanics", Theta Foundation, 2005.

• B. Calmuschi, C. Timofte, "Upscaling of Chemical Reactive Flows", Conference "Caius Iacob", Bucharest, Romania (on CD-ROM), 2005.

• C. Timofte, C. Conca, "Interactive sources of oscillations in Signorini's type problems", Partial Differential Equations and Inverse Problems, chapter in "Contemporary Mathematics 362", American Mathematical Society Book Series, Providence, Rhode Island (2004), ISBN 0-8218-3448-7.

• C. Conca, J. I. Díaz, A. Linan, C. Timofte, "Effective Chemical Reactive Flows Through Porous Media", Midnight Sun Conference, Narvik, Norway, 2004.

• C. Timofte, "On the effective behavior of some chemical reactive flows through porous media", French-Romanian Colloquium on Applied Mathematics, Craiova, Romania, 2004.

• C. Timofte, C. Conca, "Interactive sources of oscillations in Signorini's type problems", Proceedings of Pan-American Advanced Studies Institute on Partial Differential Equations, Inverse Problems and Non-Linear Analysis, 2003, Santiago de Chile, Chile.

• C. Timofte, E. Zuazua, "Dynamical boundary-value problems in perforated media", International Conference on Homogenization and Applications to Material Sciences, 2001, West University of Timisoara, Romania.

• C. Timofte, "Application of central limit theorems to thermal dispersion in periodic media", Proceedings of the First HMS 2000 International School and Conference on Homogenization, Naples, June 2001, Italy, Gakuto International Series in Mathematics, L. Carbone, R. De Arcangelis eds., pp. 281-289, 2003.

• C. Timofte, "On the asymptotic behavior of thermal Taylor dispersion processes in periodic media", Proceedings of the International Conference on Homogenization and Applications to Material Sciences, West University of Timisoara, pp. 101-110, 2001.

• C. Timofte, "Homogenization methods for thermal dispersion problems", French- Romanian Colloquium on Applied Mathematics, 2000, Constanta, Romania.

• C. Timofte, "Application of central limit theorems to thermal dispersion in periodic media", French-Romanian Colloquium on Applied Mathematics, 1998, Metz, France.

• C. Timofte, "On the asymptotic behavior of some material dispersion processes in periodic media", Military Academy, Sibiu, Romania, pp. 1-10, 1998.

• C. Timofte, "Application of central limit theorems to macrotransport processes", Proceedings of the International Conference on Analysis and Numerical Computation of Solutions of Nonlinear Systems Modelling Physical Phenomena, West University of Timisoara, pp. 416-425, 1997.