LABORATOR SIMULARE, MODELARE, PRELUCRĂRI DE DATE ŞI CONTROLUL PROCESELOR

Direcţii de cercetare:

1. Simularea si modelarea sisteme disperse de nanoparticule magnetice
2. Hipertermia magnetica
3. Modelarea de ordin redus a sistemelor dinamice turbulente
4. Studii de stabilitate a sistemelor dinamice turbulente

Teme de cercetare

1. Modele de simulare a dinamicii pentru sistemele magnetice de nanofluizi
2. Modelare de ordin redus de tip Proper Orthogonal Decomposition (POD) şi Dynamic Mode Decomposition (DMD) pentru sistemele magnetice de nanofluizi
3. Modelarea procesului de hipertermie magnetica cu nanoparticule
4. Influenţa dimensiunilor (inclusiv a dispersiei dimensiunilor) nanoparticulelor asupra procesului de hipertermie magnetică cu nanoparticule
5. Influenţa dispersiei constantelor efective de anizotropie magnetică a nanoparticulelor asupra procesului de hipertermie magnetică cu nanoparticule
6. Influenţa stratului de acoperire a nanoparticulelor asupra procesului de hipertermie magnetică
7. Influenţa frecvenţei şi a intensităţii câmpului magnetic extern asupra procesului de hipertermie magnetică
8. Factori care influenteaza aglomerarea nanoparticulelor în nanocoloid şi moduri de aglomerare
9. Influenţa aglomerarii nanoparticulelor asupra procesului de hipertermie magnetica cu nanoparticule
10. Posibilităţi de monitorizare şi control a procesului de hipertermie magnetică cu nanoparticulelor prin controlul parametrilor sistemului
11. Analiza stabilităţii sistemelor dinamice turbulente şi implementarea unor soluţii de control.

Infrastructura de cercetare: reţea de calcul paralel şi distribuit Matlab Distributed Computing Server

Colaborari internationale:

- Dr. Diana-Andra Borca-Tasciuc, Rensselaer Polytechnic Institute, Troy NY, USA
- Dr. Silvio Dutz, Institute of Photonic Technology, Jena, Germania
- Dr. Matteo Cacciola, University "Mediterranea" of Reggio Calabria, Italia
- Prof. Dr. Michael Navon, Department of Scientific Computing, Florida State University , USA

Rezultate obţinute:

- articole publicate în reviste internaţionale
- prezentarea rezultatelor cercetării la conferinţe naţionale şi internaţionale

Articole in reviste cotate ISI şi în Proceedings ISI

1. Matteo Cacciola, Mihaela Osaci, Studies about the attempt frequency influence on the effective relaxation time in a system of nanoparticles for magnetic hyperthermia, IOP Conference Series: Materials Science and Engineering (2015) 85 (1), 012021
2. Bistrian, D., Navon, I.M., An improved algorithm for the shallow water equations model reduction: Dynamic Mode Decomposition vs POD, International Journal For Numerical Methods In Fluids, Volume 78 Issue 9, Pages 552–580, 2015.

3. Bistrian, D, A Solution Of The Parabolized Navier–Stokes Stability Model In Discrete Space By Two-Directional Differential Quadrature And Application To Swirl Intense Flows, Computers and Mathematics with Applications, Volume 68, Pages 197–211, doi: 10.1016/j.camwa.2014.05.017, 2014.

4. Osaci Mihaela, Study about the possibility to control the superparamagnetism–superferromagnetism transition in magnetic nanoparticle systems, Journal of Magnetism and Magnetic Materials (2013), vol. 343, pp. 189-193
5. Bistrian, D., Mathematical And Numerical Treatment Of Instabilities Of Non-Axisymmetric Confined Vortices Under The Dirichlet Boundary Conditions, Applied Mathematical Modelling, Volume 37, Issue 6, Pages 3993-4006, doi: 10.1016/j.apm.2012.09.019, 2013.
6. Bistrian, D, Parabolized Navier–Stokes Model For Study The Interaction Between Roughness Structures And Concentrated Vortices, Physics Of Fluids, Volume 25, Issue 10, Pages 104103:1-22, doi: dx.doi.org/10.1063/1.4823746, 2013.
7. Osaci Mihaela, "Dynamic Modeling Of Ferrite Nanoparticle Systems In Radiofrequency Magnetic Fields", Proceedings Of The Romanian Academy, Series A, Vol. 11, No. 2 (2010), pp. 137–141
8. Osaci Mihaela, Manuela Panoiu, Adela Diana Berdie, Stela Rusu-Anghel, "Three-Dimensional Stochastic Model for Simulation of the Nanoparticles Geometry in Nanoparticles Dispersed Magnetic Media", Recent Advances in Computers, Proceedings of the 13th WSEAS International Conference on Computers (2009), pp.179-184
9. Osaci Mihaela, Abrudean Cristian, Berdie Adela, "Relaxation Times in Magnetic Nanoparticles System and Memory Effects", Acta Physica Polonica A, vol. 112 (2007) nr.6, pp. 1203- 1212
10. Osaci Mihaela, "The MCAMC Alghoritm Implementation (Monte Carlo with Absorbing Markov Chains) in the Study of Magnetic Relaxation Processes in Nanoparticle System", Proceedings of the Romanian Academy Series A-Mathematics, Physics, Technical Sciences, Information Science, vol.8 Issue 3 (2007), pp.197-200
11. Osaci Mihaela, Manuela Panoiu, Teodor Heput, Ionel Muscalagiu, "Numerical Stochastic Model for the Magnetic Relaxation Time of the Fine Particle System with Dipolar Interactions", Applied Mathematical Modelling 30 (2006), pp. 545-55
12. Osaci Mihaela, Cuntan Corina, Panoiu Caius, "Simulation-based study of the compensation coil method applied to ferrite nanometric powders", International Journal of Materials Research, vol. 101, no.7 (2010), pp. 914-917
13. Osaci Mihaela, "Determination of the effective magnetic anisotropy constant of ferrite nanoparticles dispersed in organic matrix", Indian Journal of Physics, 82(12) (2008), pp. 1671-1679
14. Osaci Mihaela, "The Influence of the Effective Anisotropy Constant on the Relaxation Process in Interacting Nanoparticle Systems", Proceedings of the Romanian Academy Series A-Mathematics, Physics, Technical Sciences, Information Science, vol.8, Issue 1 (2007), pp. 37-40
15. Osaci Mihaela, M. Panoiu, I. Muscalagiu, C. Panoiu, "About a simulation method of the magnetodielectrical materials properties at high frequency magnetic fields", Computational Materials Science 27 (2003) pp. 523-528
16. Osaci Mihaela, "Method of simulating magnetodielectric composite media", Journal of Magnetism and Magnetic Materials, 234 (2001), pp. 148 – 152