

WWlet: WAVELETS & APLICAÇÕES

Métodos Numéricos para PDEs e Processamento de Sinal

Sumário

Nas últimas décadas, as técnicas de wavelets tornaram-se uma importante área de pesquisa em análise numérica e uma ferramenta importante no processamento de sinal moderno. Wavelets aplicada à solução das equações diferenciais podem fornecer uma ferramenta alternativa para o desenvolvimento de métodos adaptativos, que permitem um refinamento adaptativo da solução de acordo com sua regularidade local.

Os principais objetivos desses eventos são explorar conceitos de análise de wavelets e seus aspectos teóricos, numéricos e computacionais aplicados ao campo das equações diferenciais parciais e processamento de sinais.

Também organizamos uma atividade regular de grupo científico em São José dos Campos, São Paulo, com apoio financeiro do CNPq e FAPESP e um Comitê Temático na SBMAC (www.sbmac.org.br).

Os materiais dos eventos estão disponíveis na biblioteca do INPE. Os softwares estão disponíveis no github. Entre em contato no Email: comite.wavelets@gmail.com para mais informações.

X WWlet 2021, atividades principais

- Wavelet Applications in Time Series, Signal processing, and partial differential equations (evento virtual, 10 e 11 de novembro), Programa:

Palestras:

1. Recurrent Wavelet Neural Network for time series prediction, Eniuce Menezes de Souza, State University of Paraná, Brazil
2. Multiscale approximations and applications, Jacques Liandrat, Ecole Centrale Marseille, France
3. A Wavelet-Adaptive Method for Multiscale Simulation of Turbulent Flows in Flying Insects, Kai Schneider, Aix-Marseille University, France

Apresentação de trabalhos:

1. Subdynamics in Multiple Time Scale Dynamical Systems and your Associations with Frequency Subbands via Continuous Wavelet Transform, Luciano Magrini, Federal Institute of São Paulo (IF-SP), Campus Votuporanga, Brazil
2. The use of wavelet technique for Pc5-pulsation electrodynamical characterization analysis at low-latitude conjugate stations, E. Camacho, Observatório Nacional (ON), Brazil
3. Detection of fragmentations of the QRS-complex using different entropy and complexity quantifiers based on the Wavelet Transform, Gisela Clemente, La Plata National University, Argentina
4. A case study of a gravity wave induced by Amazon forest orography and low level jet Generation, Hardiney dos Santos Martins, Federal Institute of Pará
5. Alternatives to build wavelet bases adapted to one-dimensional pattern, Damian Valdés-Santiago, Havana University, Cuba

6. Establishing a methodological approach to characterize South America Geomagnetic Disturbances, Odim Mendes, INPE, Brazil
7. Multiresolution operators applied in adaptive grid generation for Earth-magnetospheric simulations, Muller Moreira Lopes, National Institute of Space Research, Brazil
8. Adaptive multiresolution simulation of resistive magnetohydrodynamics equations, Anna Karina Fontes Gomes, Institute of São Paulo (IF-SP), Campus Cubatão, Brazil
9. Adaptive global magnetic-hydrodynamic simulations using sparse point representation, Maibys Sierra Lorenzo, Center for Atmospheric Physics, Meteorology Institute of Cuba
10. Adaptive solution of Initial value problems by A dynamical Galerkin scheme, Rodrigo Pereira, Universidade Federal Fluminense (UFF), Brazil

XI WWlet 2019, principais atividades

- Wavelet Applications in Time Series, Signal and Image processing to be held in the XVIII Time Series and Econometrics Meeting - ESTE (redeabe.org.br/este2019), Gramado, Rio Grande do Sul, Brasil 3 de set. Programa:
 - A. Wavelet-based clustering and classification, Pedro A. Morettin (IME/USP, Brasil).
 - B. Wavelet Statistical Analysis of Multitemporal SAR and Satellite Images, Aluísio Pinheiro (UNICAMP, Brasil).
 - C. Partial Directed Wavelet Covariance, Kim Samejima (UFBA, Brasil).
 - D. Multi-scale Identification of Dynamics in Chaotic Electrochemical oscillators, Luciano A. Margrini (IFSP, BraSil), Margarete Domingues (INPE, Brasil), Elbert E. N. Macau (Unifesp, Brasil).
 - E. Geomagnetic disturbances in a local regularity point of view, Odim Mendes (Space Geophysics Division - DIDGE/INPE, Brasil) Margarete Domingues (INPE, Brasil).
 - F. Evaluation of Genome Similarities: a Wavelet-Domain Approach, Telma Safadi (UFLA, Brasil).
 - G. Wavelet Neural Networks for Prediction and Classification, Eniuce Menezes de Souza (UEM, Brasil).

WWlet 2017, principais atividades

Organizadores: Margarete Domingues (INPE), Maria Teodora Ferreira (F. Bilac/UNIVAP), Cláudia Aline Mesquita UNIFESP).

- No XXXVII Congresso Nacional de Matemática Aplicada e Computacional (CNMAC), São José dos Campos, SP, Brasil 19-22 de set. 2017. Programa:
 - A. Ezequiel Echer (DGE/CEA/INPE), Multiresolution analysis of magnetic field fluctuations in the Jupiter's magnetotail.
 - B. Mariza Pereira de Souza Echer (PNPD/CAPES- GES/INPE), Study about spectral properties of the Global, hemispheric and latitudinal air surface temperature series from NASA/GISS database and Sunspot Number by wavelet analyses.
 - C. Eniuce Menezes de Souza (UEM), Forecasting with Wavelet Hybrid Models

- D. On this occasion we pay posthumous homage to Dr. Daniel Nordeman for his achievements, conducted by Mariza Echer.
- E. Ralf Deiterding (Univer. of Southampton, UK), Wavelet criteria in magnetohydrodynamics modelling using the parallel framework AMROC
- F. Müller Moreira Lopes (CAP/INPE), High order time synchronisation in multiresolution adaptive models.
- G. Gilcélia Regiane de Souza (Federal University of São João del-Rei), Jorge Stolfi (UNICAMP) Sampled irregularly functions approximation with tensorial elements compacts adaptive hierarchical bases
- H. Discussões do Comitê Multiescala

VIII WWlet 2016, principais atividades

1. **Seminários Regulares (INPE): Wavelet Applied to Space Physics (WASP)** Organizadores: Margarete Domingues, Odin Mendes, and Renato Branco
2. **Minicurso (INPE): Block-Structured Adaptive Mesh Refinement in C++: The AMROC Framework for Parallel AMR** by Dr. Ralf Deiterding, University of Southampton 30 de junho e 1º de julho 2016, São José dos Campos, São Paulo, Brasil. Suporte Financeiro: FAPESP-Newton Fund and British Council (grants 2015/50403-0 e 2015/25624-2) . Organizadores: Celso Mendes Margarete Domingues, Odin Mendes, and Renato Branco.

WWlet 2015, principais atividades

1. **Seminários Regulares (INPE): Wavelet Applied to Space Physics (WASP)** Organizadores: Anna Karina Fontes Gomes, Margarete Domingues, Odin Mendes e Renato Branco.
2. **DINCON - Conferência Brasileira de Dinâmica, Controle e Aplicações** em Natal, Rio Grande do Norte, Brasil
 - A. **Minicurso:** Continuous Wavelet transform, por Margarete Domingues e Odin Mendes
 - B. **Seção técnica** em Aplicações Wavelet

WWlet 2014, principais atividades

1. **Seminários Regulares (INPE): Wavelet Applied to Space Physics (WASP)** Organizadores: Anna Karina Fontes Gomes, Margarete Domingues e Odin Mendes.

VII WWlet 2013, principais atividades

1. **DINCON - Conferência Brasileira de Dinâmica, Controle e Aplicações** em Fortaleza, Ceará, Brasil
 Organizadores: Eniuce M. de Souza (State Univ. of Maringá) e Margarete Domingues (INPE)
 - A. **Encontro de grupo temático:** Wavelet transform
 - B. **Seção técnica** em Aplicações Wavelet

Organizadores: José Eduardo Castilho (UnB of Planaltina), Margarete Domingues (INPE), Magda K. Kaibara (UFF), Odim Mendes (INPE) e Aylton Pagamisse (UNESP - Presidente Prudente)

1. XXXVI CNMAC, 17 a 21 de set., Águass de Lindóia, São Paulo, Mini Simpósio
 - A. Reconstruction of tokamak plasma light emission from single images by wavelet-vaguelette decomposition. Romain Nugyen van yen, Freie Universität, Germany
 - B. Wavelet analysis of intermittency in MHD turbulence. Marie Farge, ENS, Paris, France
 - C. Dual-Tree Wavelets and their application to Vision Systems - introducing wavelet-based key-point detectors and robust keypoint descriptors with rotation invariant properties. Nick Kingsbury, Cambridge University
 - D. Dual-tree wavelet and new techniques to phase determination in control systems. Elbert Macau, INPE
 - E. A wavelet-based filtering of ensemble background-error variances. Olivier Pannekoucke, Meteo-France, France
 - F. Adaptive multiresolution or adaptive mesh refinement? Kai Schneider, Aix-Marseille University, France
 - G. Wavelets methods and applications to artificial satellite signals. Eniuce Menezes de Souza, Universidade Estadual de Maringá - PR
 - H. Multiscale methods to solve differential equations in visual computation. Jorge Stolfi, IC/UNICAMP
2. XXXVI CNMAC, 17 a 21 de set., Águas de Lindóia, São Paulo, Minicurso
 - A. Introdução ao mundo das wavelets, José Eduardo Castilho (UnB), Margarete Domingues (INPE), Odim Mendes (INPE), Aylton Pagamisse (UNESP-Pres. Prudente)
 - B. Complex-valued wavelets, the dual tree, and Hilbert pairs: why these lead to shift invariance and directional m-D wavelets? (3,5 hours), Nick Kingsbury, Cambridge University
3. XXXVI CNMAC, 17 a 21 set., Águas de Lindóia, São Paulo, Seções técnicas
4. Minicursos, seminários e eventos satélites (em INPE, UFF, UFRJ, UNICAMP, 10 a 27 de set.):
 - A. UFF - Dual-Tree Complex Wavelets - their key properties and a range of image-processing applications Nick Kingsbury, Cambridge University (IC-UFF 12 de set.)
 - B. UFRJ - D'Alembert's paradox and the resistance of fluid flows in the fully-developed turbulent regime: still an open problem Marie Farge, ENS, Paris, France
 - C. INPE - How wavelets are used to study turbulent transport in fluid and plasma flows Marie Farge, ENS, Paris, France Kai Schneider, Aix-Marseille University, France Romain Nugyen van yen, Freie Universität, Germany
 - D. INPE - A wavelet-based filtering of ensemble background-error variances. Olivier Pannekoucke, Meteo-France, France (INPE, Cachoeira Paulista, 24 de set).

V WWlet, 2011 principais atividades

Organizadores: Margarete Domingues (INPE), Odim Mendes (INPE) e Aylton Pagamisse (UNESP - Presidente Prudente)

1. Mini Simpósio 6 Programa: 29 de ago.

- A. Transformada wavelet e super-resolução de imagens, Aylton Pagamisse, Marco Antonio Piteri
- B. Multiscale of geomagnetic disturbances: Case study in South Atlantic anomaly region, Odim Mendes, Marize Correa Simões, Margarete Oliveira Domingues, Varlei E. Menconi
- C. Wavelet de Meyer como regularizadora de equações tipo Cauchy-poisson de interesse da física de plasma espacial, Margarete Domingues, Magda Kaibara, Odim Mendes

2. Mini Simpósio 6 Programa: 30 de ago.

- A. Esquemas Lifting-wavelet interpolador para equações diferenciais parciais, José Castilho
- B. Detecção da sincronização de fase entre sistemas com dinâmica caótica empregando a transformada wavelet complexa dual-tree, Maria Teodora Ferreira, Elbert E. N. Macau, Rosângela Follmann Bageston, Margarete Oliveira Domingues

3. Outras atividades:

- A. Discussão da proposta de grupo temático dentro da Sociedade Brasileira de Matemática Aplicada e Computação (SBMAC).
- B. Apresentação das propostas de mestrado e doutorado Coordenadores: Aylton Pagamisse, Magda Kaibara, Odim Mendes. Suporte financeiro CAPES, CNPq, FAPESP

IV WWLET, 2010 principais atividades

Organizadores: Margarete Domingues (INPE), Magda K. Kaibara (UFF) e Odim Mendes (INPE)

1. IV WWLET, no DINCON, Serra Negra, SP, Brasil 7 a 11 de junho, Programa:

- A. On the use of Harmonic Wavelets for the solution of some PDE's and an application to a precipitation front propagation model, Saulo R. M. Barros, Pedro da Silva Peixoto, Universidade de São Paulo, São Paulo, Brasil
- B. Wavelet based Faraday Rotation Measure Synthesis, Peter Frick, Rodion Stepanov Institute of Continuous Media Mechanics of Ural, Branch of the Russian Academy of Sciences, Perm, Russia, Dmitry Sokoloff, Department of Physics, Moscow State University, Moscow, Russia
- C. Wavelet analysis of bioimpedometric data, Peter Frick, Rodion Stepanov, Institute of Continuous Media Mechanics of Ural, Branch of the Russian Academy of Sciences, Perm, Russia, Sergey Podtaev Department of Physics, Perm State University, Bukireva str. 15, Perm, 614990, Russia, Andrew Dumler, Perm State Medical Academy
- D. Revealing Physical Process in Space Plasma Disturbances with Wavelet Analysis, Anthony T. Y. Lui, Johns Hopkins University (JHU/APL), Laurel, MD 20723-6099, USA
- E. Application of multi-scale analyses on solar images from SOHO and STEREO, Guillermo Adrián Stenborg, Interferometrics, Inc., USA.
- F. Image Analysis Based on Wavelet Transforms, Helio Pedrini Instituto de Computação, UNICAMP, Campinas, Brasil

2. Grupos de trabalho, INPE, 2 a 6 de junho:

- A. Wavelet applied to MHD-turbulence, Organizers: Margarete Domingues, Peter Frick, Magda Kaibara, Odim Mendes
- B. Wavelet applied to Quasar dataset, Organizers: Luis Botti, Margarete Oliveira Domingues, Peter Frick, José Soto
- C. Wavelet applied to solar physics. Organizers: Guillermo Adrián Stenborg, Alisson Dal Lago

3. Grupos de trabalho, no DINCON, Serra Negra, SP, Brasil 7 a 11 de junho

- A. Wavelet applied to Geomagnetic analysis, Margarete Oliveira Domingues, Peter Frick, Odim Mendes, Virginia Klausner
- B. Wavelet applied to solar physics. Organizers: Guillermo Adrián Stenborg, Alisson Dal Lago

4. Grupos de trabalho: Serra Negra e INPE, 12 a 13 de junho. Wavelet applied to reconnection problems. Organizadores: Margarete Domingues, Magda Kaibara, Anthony Lui, Odim Mendes, Arian Gonzalez

5. Minicurso no DINCON, Serra Negra, SP, Brasil 11 de junho

Shell models - a dynamical systems approach to fully developed turbulence, Dr. Peter Frick, Institute of Continuous Media Mechanics of Ural, Branch of the Russian Academy of Sciences, Perm, Russia

Suporte Financeiro CAPES, CNPq, FAPESP

III WWLET, 2009 principais atividades

Organizadores: Margarete Domingues (INPE), Magda K. Kaibara (UFF), Odim Mendes (INPE) e Alice de Jesus Kozakevicius (Univ. Santa Maria), Suporte Técnico: Thiago Pedro Donadon Homem (Pós-graduação Engenharia Elétrica Faculdade de Engenharia - FEB Universidade Estadual Paulista - Unesp)

- Mini Simpósio - 19 de maio. Programa:

- A. Double Wavelet Analysis - method for recognising stellar activity peculiarities Peter Frick, Institute of Continuous Media Mechanics of the Ural Branch of the Russian Academy of Sciences, Perm, Russia.
- B. Wavelets to compute turbulence: Burgers, Euler, Navier-Stokes Equations Marie Farge, Ecole Normale Supérieure, Paris, France.
- C. Numerical simulations of the Stefan problem using wavelets Jacques Liandrat, Centrale Marseille, France
- D. Detection of convective rolls using continuous wavelets transform Angela Leó Meciás, Facultad de Matemática y Computación, Havana, Cuba.
- E. Error map technique in dyadic meshes Jorge Stolfi, Instituto de Computação, UNICAMP
- F. Multiresolution and Adaptive Mesh Refinement schemes: a comparative study Ralf Deiterding, Margarete O. Domingues, Sônia M. Gomes, Olivier Roussel and Kai Schneider, Departamento de Matemática Aplicada, IMECC-UNICAMP

- G. An adaptive multiresolution method for the Coherent Vortex Simulation (CVS) of compressible turbulent flows Olivier Roussel and Kai Schneider FAPESP Visiting researcher at Departamento de Matemática Aplicada, IMECC-UNICAMP
- H. The use of Daubechies bases in Wavelet-Galerkin method Maria Tereza Martins and Victoria Vampa, Departamento de Matemática, Facultad de Ciencias Exactas, Universidad Nacional de La Plata, Argentina
- Mesa Redonda: Aplicações. Odim Mendes (Presidente)
 - A. Wavelets in Wannier functions Alexys Bruno Alfonso (UNESP/Bauru)
 - B. Improving the estimation of daily rainfall from NDVI using the wavelet transform Adolfo Nicolas Posadas Durand(Visiting researcher at Embrapa Instrumentação Agropecuária, International Potato Center -CIP)
 - C. Image segmentation challenges and possible solutions with wavelets Rafael Santos (INPE)
 - D. The wavelet transform applied to bifurcation in the dynamic population models Matheus Alvarez and José Raimundo de Souza Passos(UNESP/Botucatu)

Suporte Financeiro Capes, CNPq, FAPESP

II WWlet, 2008 principais atividades

1. no CNMAC, Belém/PA, 11 de set. 2008, no 31º Congresso Nacional de Matemática Aplicada e Computacional
2. Programa:
 - A. Sparse point representation techniques with time step control, Sônia Gomes(UNICAMP), Andrielbe Oliveira, Anamaria Gomide(UNICAMP), Margarete Domingues(INPE), Paulo Jorge Gonçalves Ferreira(Univ. Aveiro, Portugal), José Rocha Pereira (Univ. Aveiro, Portugal), Pedro Renato Tavares Pinho (inst. Lisboa, Portugal).
 - B. Application of PML absorbing boundaries in the SPR method, Pedro Renato Tavares Pinho(Inst. Lisboa, Portugal), Paulo Jorge Gonçalves Ferreira, José Rocha Pereira(Univ. Aveiro, Portugal), Sônia Maria Gomes(UNICAMP), Andrielber Oliveira(UNICAMP), Anamaria Gomide(UNICAMP), Margarete Domingues(INPE).
 - C. Numerical solution of hiperbolic-elliptic systems of conservation laws by multiresolution schemes, Alice de Jesus Kozakevicius(USM), Stefan Berres(USM), Raimund Bürgers(Univ. Concepcion, Chile)
 - D. Algorithms on adaptive dynamic grids, Jorge Stolfi (UNICAMP)
 - E. Adaptive multiresolution methods for evolutive PDEs, Margarete Domingues(INPE), Sônia Maria Gomes(UNICAMP), Olivier Roussel (Unv. Klaushe, Germany), Kai Schneider (Univer. Aix-Marseille). 6. Numerical methods for generalized KDV equations, Mauricio Sepulveda Cortes (Univer. Concepción, Chile), Octavio Vera Villagran(Univer. Bio-Bio, Chile).
 - F. Discussões: Magda Kaibara (presidente)

Suporte Financeiro CAPES, CNPq, FAPESP

I WWlet 2007, principais atividades

Organizadores: Chou Sin Chan (INPE), Elbert Macau (INPE), Margarete Domingues (INPE) e Odím Mendes (INPE). Equipe técnica: Maria Cristina Peloggia de Araújo (Secretary), Marize Simões (Engineer) e Varlei Menconni (Enginner)

- no INPE São José dos Campos, Brasil, 5 a 7 de nov.

A. Palestras: Sônia Gomes (IMECC/Unicamp), Anamaria Gomide (IC/Unicamp), Alice Kozakevicius (UFSM)

B. Discussões técnicas: Sônia Gomes, Anamaria Gomide, Elbert Macau, Margarete Domingues, Odím Mendes.

Promoção: INPE. Co-patrocinadores ApLBA, CAPES, CNPq

Snapshots:

