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16° Workshop de

WORCAP

COMPUTAÇÃO

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25 e 26 de outubro de 2016

Auditório Fernando de Mendonça - LIT

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Livro de Resumos
16 Workshop de Computação Aplicada
Pós-Graduação em Computação Aplicada (CAP)

25 e 26 de outubro de 2016

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RESUMOS

SESSÃO TÉCNICA 1

3DBMO: A TIME SERIES CANONICAL GENERATOR TO STUDY THE PSD DIMENSIONAL DEPENDENCE IN COMPLEX PHYSICAL SYSTEMS

Paulo Zeferino, Reinaldo Rosa, Murilo Dantas

The study of density, magnetic and electric field fluctuations in real systems, such as nonlinear processes in the solar, magnetospheric and ionospheric environments, is generally analyzed using Power Spectrum Density (PSD) which is calculated from one-dimensional data in the form of time series. In this work we present a new simulation device of multi-dimensional harmonic mechanical oscillations (we call 3DBMO) for generate robust time series from selected elements, where the spectral analysis is used to determine the hypothesis of dependence variation of the power spectrum according to the structure of the generated system.

SIMULAÇÃO DE UM MODELO MAGNETO-HIDRODINÂMICO RESISTIVO NO CONTEXTO DA MULTIRRESOLUÇÃO ADAPTATIVA

Anna Gomes, Margarete Domingues, Odim Mendes

Para simular fenômenos físicos de escala macroscópica de interesse das Ciências Espaciais, em particular o comportamento de um plasma, utiliza-se o modelo magneto-hidrodinâmico. Com o modelo magneto-hidrodinâmico é possível estudar o comportamento de um fluido condutor sob a influência de um campo magnético. Neste trabalho, tem-se interesse na abordagem resistiva desse modelo, na qual não há conservação de fluxo magnético devido ao termo de resistividade Ôhmica. Esse tipo de simulação numérica tem o custo computacional elevado e, com isso, utiliza-se a análise multirresolução adaptativa por médias celulares para que a malha computacional seja adaptada às estruturas locais do problema, evitando o uso desnecessário de memória. O esquema numérico utilizado para a simulação é de segunda ordem, incluindo uma discretização pelo método dos volumes finitos, aproximação do fluxo com um esquema do tipo Harten-Lax-Van Leer, reconstrução das variáveis conservativas com o limitador Monotonized Central e evolução temporal com um esquema Runge-Kutta compacto. Os resultados preliminares dessa simulação são apresentados e comparados com os obtidos com o código FLASH.

ROTATION-BASED SAMPLING MPCA-HJ FOR VIBRATION-BASED DAMAGE IDENTIFICATION

Reynier Torres, Haroldo Campos Velho

The structural vibration-based damage identification is formulated as an optimization problem. The objective functional is expressed by a least square difference between measured and computed forward model displacements. The latter functional is minimized by using the hybrid metaheuristic Rotation-based sampling Multi-Particle Collision Algorithm with Hooke-Jeeves (RMPCA-HJ).

Multi-Particle Collision Algorithm (MPCA) is a stochatic optimization method inspired on the physics in the nuclear reactor, where absorption and scattering phenomena are represented. In the MPCA algorithm, a set of particles (solutions) travels in the search space. After a certain number of function evaluations, they share the best particle solution found. MPCA – working together to the Rotation-Based Learning (RBL)– is used as a first stage of the hybrid method performing a global exploratory search. RBL is a novel extension of Opposition-based Learning (OBL). In RBL, a rotated solution is calculated by applying a specific rotation angle to the original solution. Here, the new Rotation-Based Sampling (RBS) solution projects a point between the original solution and its rotated solution. RBS could be more flexible than RBL – and also OBL – to find the promising candidate solutions. The intensification search stage of the hybrid metaheuristic is addressed by the direct search Hooke-Jeeves (HJ) method. HJ consists of the repeatedly application of exploratory searches for all dimensions around a base point. If the exploration has success finding a better solution, a pattern move is performed.

The hybrid algorithm is tested to identify damages over a truss structure. Experimental data was generated in silico, using time-invariant damages. Experiments with noiseless and noisy data, under several noise level, were carried out. Good estimations of damage location and severity are achieved.