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Mathematics

THE FLOW AND HEAT TRANSFER IN A VISCOUS FLUID BY A HORIZONTAL SHEET

Remus-Daniel ENE

Abstract. The flow and heat transfer in a viscous fluid over an unsteady stretching surface is studied. The governing equations are reduced to ordinary differential equations through the similarity transformation. To solve these equations we applied Optimal Homotopy Asymptotic Method (OHAM). Our procedure is based on a new construction of the solutions by means of the auxiliary function and especially on the involvement of the convergencecontrol parameters. The results obtained reveal that the proposed method is effective and easy to use.

Keywords and phrases: optimal homotopy asymptotic method (OHAM), film flow, heat transfer

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INTERPOLATION BETWEEN SUM AND INTERSECTION OF FR´ECHET SPACES

Dan LUPULESCU, Ciprian HEDREA and Nicolae COFAN

Abstract. The theory of interpolation usualy deals with interpolation of Banach couples. In the case we mention in particular the K and J methods. The purpose of this paper is to extend Maligranda's theorem of interpolation between sum and intersection of Banach spaces to Fr´echet spaces.

Keywords and phrases:Interpolation of locally convex spaces.

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A STUDY OF EQUILIBRIA OF A NEW SYSTEM WITH CHAOTIC BEHAVIOR

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Abstract. In this paper the equilibrium points of a three-dimensional system with chaotic behavior considered in a previous work are analysed. Using Lyapunov's stability criterion, Routh-Hurwitz theorem and local center manifold theory the stability of these equilibria is studied.

Keywords and phrases: Chaotic system, stability, local center manifold.

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SOME PROPERTIES OF INTERPOLATION OF LOCALLY CONVEX COUPLES

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Abstract. We extend some interpolation results from Banach couples to locally convex couples.

Keywords and phrases: Interpolation of locally convex spaces.

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ON THE EFFICIENCY OF THE PARABOLOIDAL CONCENTRATOR INSTALLED ON ORIENTED ROOFS

Ciprian HEDREA, Ioan ZAHARIE, Romeo NEGREA, Emanuel DANCI and Mihai PĂTRĂŞCOIU

Abstract. The electrical energy obtained by photovoltaic effect is costly because the used materials are expensive. In the same time the efficiency is low. Thus there is an increasing interest in finding solutions to improve the efficiency of the photovoltaic conversion. One of the possible solutions consists in the concentration of the solar light using concentrators installed on oriented roofs. To optimize the efficiency of such concentrators we have identified a suitable position for a photovoltaic cell on the symmetry axis of the paraboloid, a position that maximizes the efficiency of the concentrator. The estimation is based on data obtained from simulations performed by a software tool which uses the Ray-tracing technique in order to determine the distribution of the Sun rays inside the concentrator. The simulations allowed to obtain the dependence between the optimal position of the cell and the declination of the Sun.

Keywords and phrases: Solar concentrators, modeling and analysis of, solar irradiance, energy efficiency.

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Physics

ASSESSMENT THE ACCURACY OF NOWCASTING SUNSHINE NUMBER

Oana MARES, Nicolina POP and Marius PAULESCU

Abstract. Sunshine number is a binary variable stating whether the sun shining or not. This paper is devoted to short-term forecasting of the sunshine number series. From a large variety of the tested models, simple exponential smoothing and ARIMA models proved to be adequate solutions for modeling sunshine number series. The accuracy of these two models applied on the sunshine number series measured in Timisoara is assessed.

Keywords and phrases: sunshine number, statistical models, forecasting.

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FINITE ELEMENT MAGNETIC FIELD MODELING OF INDUCTOR FOR MAGNETIZER

Vladimir PETROV

Abstract. The finite element method has been employed for modelling of the transient magnetic field of an inductor for magnetizer. The model includes also the permanent magnet to be magnetized, as well as the magnetic system where the magnet is embedded. Two construction variants of the inductor are considered – without and with additional copper rings, located between the sections of the inductor. The field has been analyzed using program as axisymmetric, considering the inductor to be supplied by a pulse voltage.
Results are obtained for magnetic field distribution, current density in the massive parts and the total current in the inductor.

Keywords and phrases: Inductors, Magnetizers, Finite element method

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COMPARISON BETWEEN DIFFERENT RIGID SUBSTATION BUSBARS USING THREE-DIMENSIONAL FINITE ELEMENT MODELLING

Tatyana RADEVA

Abstract. Three-dimensional finite element method has been employed for comparison of two types of busbar sysetms in a substation - single-layer busbars and double-layer busbars. The busbars are of rectangular cross-sections. The comparison is made between the electrodynamic forces in two modes - steady state and transient at short circuit conditions.The results show that double-layer busbars feature lower electrodynamic forces and can be recommended.

Keywords and phrases: Busbar system, Electrodynamic force, 3D finite element method.

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COMPARISON BETWEEN FORMULATIONS OF THE TRANSCRANIAL MAGNETIC STIMULATION MODEL

Branko GRANULA and Mico GACANOVIC

Abstract. Numerical simulations of the Transcranial Magnetic Stimulation (TMS) procedure can be used to precisely predict the intensity and area affected by the electric field induced in the patient's brain during the procedure. Computer-aided modelling and simulations of the TMS procedure prove to be time-consuming and computationally intensive processes, especially in cases when it is required to run a large number of simulations using different models and parameters. In order to make this approach more accessible in practice, it is necessary to reduce computation time and time necessary to set up the model as much as possible while maintaining satisfactory level of accuracy. In the scope of this paper we aim to review and give a comaparison of two different approaches in modelling the TMS procedure, i.e. an A-V (magnetic vector potential – electric scalar potential) and V (electric scalar potential) formulation.

Keywords and phrases: Electromagnetic induction, Finite element method, Transcranial magnetic stimulation

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