

Entropy analysis of radiative MHD forced convection flow with weakly temperature dependent convection coefficient in porous medium channel

PARESH VYAS, ASHUTOSH RANJAN

Abstract. Steady laminar flow of an incompressible MHD radiative fluid inside a fluid saturated porous medium trapped in parallel plates channel is investigated. The upper impermeable wall of the channel moves with a uniform velocity whilst the lower wall is kept stationary. The lower wall is subject to convective flux whereas the upper wall is isothermal. Convective coefficient is assumed to be weakly temperature dependent. A magnetic field of uniform strength is applied transversely in direction opposite to gravity. Rosseland approximation is assumed to describe the radiation flux. The governing equations are solved analytically. The velocity profiles, temperature distributions, entropy generation and Bejan number are portrayed graphically for varying parameter values and are discussed.

Contents

Induction heating of thin nonmagnetic sheets in transverse time-variable magnetic field

JAN HRBEK

Abstract. Induction heating of thin nonmagnetic sheets in transverse time-variable magnetic field is modeled. The magnetic problem is solved using the electric vector T -potential, the thermal problem is solved using the heat transfer equation with modified boundary conditions. The results are compared with measurements on a physical model, the tested samples being three aluminum sheets of low thicknesses.

Contents

The Poynting vector along two parallel overhead lines during a single-phase short circuit

ROMAN HAMAR, PETR KROPÍK, LENKA ŠROUBOVÁ

Abstract. The directional energy flux density (Poynting vector) along two parallel power overhead lines during a single-phase short circuit of one of the lines is investigated, with the aim to evaluate their transfer capabilities and mutual influencing. The computation of an electromagnetic field along parallel power overhead lines was performed by means of an integral method in 3D arrangement, taking into account the location of the suspension towers. The methodology is illustrated by a typical example.

Contents

Experimental measurements of the skin effect and internal inductance at low frequencies

MALCOLM S. RAVEN

Abstract. Experimental measurements of the low frequency skin effect and internal inductance are given for a number of copper wires with different diameters and various linear solid cylindrical conductors including rods of copper, aluminium and brass. The measurements were compared with reference resistors, inductors and capacitors. The results obtained compared well with tests using a precision LCR meter at three spot frequencies and measurements using A.F. and R.F. impedance bridges over a range of frequencies. The final results were compared with theoretical analysis using Bessel functions that revealed the detection of the internal inductance of rods and wires which are several orders less than the external inductance. Deviations of the measured resistance exceeding the theoretical power law frequency dependence are discussed in terms of errors in the measurement techniques, resonance, transmission line reflections, radiation resistance and proximity effects.

Contents

Induction MHD-pump with flat coils

FEDOR E. TARASOV, SERGEY BYCHKOV,
SERGEY L. NAZAROV, VASILII E. FRIZEN

Abstract. Computer simulation results of an induction magnetohydrodynamic pump designed for transportation of light non-ferrous metals is carried out. An original design of pump windings is proposed and justified by the simulation.

Contents

Optimal frequency determination of induction MHD pump power supply

SERGEY A. BYCHKOV, SERGEY L. NAZAROV,
FEDOR E. TARASOV, VASILII E. FRIZEN

Abstract. Electromagnetic 3D model of an induction MHD pump with planar structure working with transverse magnetic field is presented and analyzed. The results obtained by the numerical simulation are processed and summarized.

Contents

Multicriteria optimization of processes for ensuring the quality and reliability of radio electronic devices

YURIY BOBALO, LEONID NEDOSTUP,
MYROSLAV KISELYCHNYK, MYHAYLO MELEN,
PAVLO ZAYARNYUK

Abstract. The possibility of enhancing the effectiveness of the processes directed to the ensuring of quality and reliability of radio electronic devices in case of sustainable consumption of the employed technical and economic resources is considered. Unlike the existing methods, it is proposed an efficient one that is based not on a local, but on a complex optimization of the given processes by using end-to-end mathematical models for assessing the defectiveness and total production expenses, as well as a single index of quality. This index serves as a parameter of their multi-criteria complex technological optimization.

Contents

A single-cell replacement strategy on electronic array self-healing

MINJIE WU, TIANZHEN MENG, XIAOFA ZHANG,
QI FENG, NAICHANG YUAN

Abstract. Embryonic bionic hardware has made great progress since it was proposed, but its self-healing strategies still has some problems, for example, there is too many redundant hardware resources, too long time it takes, too complex it self-repairing method be. On the basis of the repair methods scholars has proposed, a new strategy on the self-repairing of electronic arrays was given. The key idea of the new strategy is when cells in the array fail, using spare cells replace them, with no change of the normal cells. For this self-repairing strategy, the original cell array structure has changed, containing three parts. 1 An array of working cells, completing the circuit's function by intercellular Collaboration. 2 A layer of spare cells, to replace the failed work cell to complete its function. 3 Control layer, connecting the layer of working cells and the layer of spare cells, to assign specific spare cell to replace the wrong cell and implement the communication between the failed cells and its corresponded repairing cell. Through theoretical analysis it was achieved that the new single-cell replacement strategy has the following advantages: easier implementation and largest self-healing capacity. It has obvious advantages over the existing self-repairing strategies.

Contents