

STEAM ENGINE–PUMP WITH PERCUSSIVE BOILING

Professor I. Shekriladze, Professor E. Machavariani, Associate Professor G. Gigineishvili,
Academic Doctor D. Shekriladze

Summary

The paper describes the current state and prospects for further development of steam engine-pump (SEP) powered by low potential heat. The SEP differs from classical membrane pump by upper part that represents the simplest heat engine with opposing pair, evaporator (heated from above cover with downward-facing capillary surface) and upward-facing condenser (a membrane cooled from below by pumped water), and certain charge of lowboiling working agent. When integrated in standalone hot water supply with solar flat-plate collector(FPC) the SEP can pump water from water well through the FPC to hot water tank located at high mark, without electric power consumption and virtually no heat loss. The SEP can also circulate water in cooling system of stationary diesel power unit, using the exhaust heat instead spending for it the part of the engine power. In the early years three prototypes of the SEP have been developed. At the present stage new (forth) prototype is developed with so-called “two-speed condensation mode” ensuring improved performance. Feasibility of the pumping process and encouraging level of efficiency are demonstrated. The problem of selfstartup is also solved. The thermodynamic cycle of the SEP is considered. The peculiar stage of the cycle is identified when the pair membrane-condensed working agent hits the dried and overheated evaporator. Sandwiched between the evaporator and membrane condensate undergoes peculiar process of boiling that we call percussive boiling. The results of modeling and experimental study of the percussive boiling are also presented.

Lit.: Proceedings of the 2 nd Thermal and Fluid Engineering Conference (TFEC 2017).
TFECIWHT 2017-18815.

SIMULATION OF A SINGLE-BIT MODULATOR FOR DIGITAL SIGNALS BASED ON LABVIEW

Z.Azmaiparashvili, I.Modebadze, G.Murjikneli, G.Murjikneli

Summary

In this article considered the structural diagram of a digital signal one bit modulator and created on its basis model in the LabVIEW environment. A structural diagram of the device and the corresponding block diagram and front panel of a created virtual instrument. International Scientific Conference. Agricultural and transport vehicles: development perspectives with modern standards of standardization and quality management. Collection of Works, Kutaisi, 21-23 April 2017. p.170-172.

Digital Processing of the analog signals

Z. Azmaiparashvili, G. Murjikneli, G. Murjikneli.
Georgian Technical University. 2017.

Summary

The textbook of “Digital processing of the analog signals” consists of Introduction and four chapters. The first chapter provides a theoretical basics of sampling of the analog signals. The second chapter discusses static and dynamic characteristics of digital signals. In the third chapter it is presented main schemes of transformation of the analog signals into digital form and it is analyzed their functional principals. The fourth chapter is dedicated to the analyses of reference voltage sources for digital processing of analog signals.

The textbook is intended for students of Georgian Technical University, who need to study microprocessor based digital measurement techniques.

Architecture of Quality Management System

Elisabed Khakhutashvili, Academician Doctor, Associate Professor

Resume

In the article is discussed architecture of quality management system, value of quality for affective management activities. For quality insurance is required not only material bases, qualified personnel, but also correct organization, considering human factor and psychology, impact of social factors and environmental parameters.

Quality Management is method of technique and activities having operative nature, which are used for performance of quality requirements.

The quality as object of management has all components of management such as planning, analysis and control.

As it is given in the article the quality management is considered as system, the concept of architecture of which implies improvement of competitiveness of organization, effectiveness, economy, productivity.

The quality management concept is cyclic process, the architecture of which includes standardization of important processes, incentive system. The quality management process may be imagine in the form of “quality loop”, in which for elimination of the defects the management cycle is repeated on higher level, due to which after obtaining quality it turns into “quality spiral”.

Thus ISO 9000 standards in telecommunication were based on architecture of quality management system, which is the prerequisite of successful business.

Is discussed architecture of quality management systems in telecommunication sphere (TL 9000), standard requirements of which have multi-level structure.

Journal "Ganatleba", GTU, 2017, No. 3 (19). P. 197-202.

VIRTUAL THERMAL DIAGNOSTICS OF TECHNICAL UNITS

O.Kiguradze, K.Chkhikvadze, N.Kezheredze, T.Chkhikvadze

Summary

Methods of thermal engineering diagnostics of heat power plants and the principle of the virtual laboratory task created for studying these methods are considered. Virtual task is created in Visual Basic. Principle operation of these task is based on the methods of operation of the gas analyzer of testo 335. It clearly demonstrates the operation stages of a real measuring device.

Journ. "Energy" 2(82). p.63-66, 2017

IMPACT OF THE SOURCES OF INDUSTRIAL FREQUENCY ELECTROMAGNETIC FIELD ON HUMAN HEALTH AND THEIR LEGAL REGULATION ISSUES

T. Museliani, A. Vashakidze, G. Tsopurashvili.

Summary

Electromagnetic field generated by the air transmission line and the issues of legal regulation of the impact of the electric and magnetic components of such field on human health as well as permissible levels of such components in Georgia and In former Soviet countries are presented.

Journ. "Energy" # 2 (82). 2017. P. 17-22.

**ELABORATION OF MATHEMATICAL MODEL OF CONTACTLESS CONDUCTOMETER
USING MAGNETIC CONDUCTOR PARAMETERS**

T. Museliani, N. Iebanidze-Asatiani, I. ShavtvaliShvili

Summary

Contactless conductometer using the magnetic conductor parameters is elaborated based on a theory of linear electric circuits. It allows to produce the desired sensitivity contactless conductometer using the pre-determined self-induction and mutual-induction coefficients.

Journ. "Energy" # 2 (82). 2017. P. 94-97

**MATHEMATICAL MODEL OF FAST ACTIVE CAPACITY REGULATION EQUIPMENT
IN THE ENERGY SYSTEM**

T. Kokhraidze, O. Kheladze

Summary

Superconductor inductive collector (SIC) in form of fast active capacity regulation equipment in the energy system is reviewed. Computation mathematical model for the operation of SIC in the energy system which is based on presenting SIC as a power source or with the active non-linear and inductive resistances connected by their equivalent sequence was developed. Mathematical model developed for SIC functioning will be used in active capacity mode for evaluating its energetic properties providing the sustainable operation of the generators during the power interruption. Ill. 5, bibl. 1.

Journ. "Energy". №4(84). 2017. Tbilisi. p. 30-36.

SUPERCONDUCTOR TRANSFORMERS BASED ON ENERGETIC CRYOTRON

T. Kokhreidze, G. Kadagishvili

Summary

Important features in designing the cryotrons such as the value of marginal power in ventile element (valve) of cryotron and current in the managing coil through which the total management magnetic field achieves critical value after switching it on the valve surface and in all points of its volume, is reviewed. Respectively, the process of switching the cryotrons is split in three stages the review of which allows to evaluate fast action of switching element considering the features of the superconductor material as well as the energy losses during switching.

A parameter allowing to fully evaluate the suitability of the given superconductor for the purposes to manufacture the valve in order to conduct the comparative analytical evaluation of the value of the superconductor material of the cryotron valve is suggested. Basic relations that were used in the analysis of the two-loop circuit connected by one cryotron was obtained.

Journ. "Energy". №4(84). 2017. Tbilisi. p. 20-29.

Determination of the parameters of a strong pulsed magnetic field generator

Sh. Nemsadze, M. Giuashvili, Av. Toronjadze

Resume

Areas of use of strong impulse magnetic field are given, effectiveness of this method and, respectively relevance of the problem posed are noted. Four the main part of strong magnetic field impulse generator – the impulse current generator the principal electrical circuit and the main parameters of the generator, as well as the designing methods for their determination also are given. It is noted that impulse magnetic field acting on a metal construction causes impulse deformations and acceleration of the construction (metal rod), in which they propagate in the form of wave and may be used as a impact booth four determination of mechanical dynamic characteristics of construction materials, as well as four determination of shockproof, impact durability and other dynamic characteristics of a variety of objects (semiconductor devices, piezoelectric, strain gauge measuring sensors).

It is also noted the effectiveness of assembly and welding technology of parts having axial symmetry and made of copper, aluminum and their alloys by magnetic impulse method, when the details are so located, that their contact surface resistance is included in the circuit of induced current loop and takes place their welding. In this case at the contact area of welding parts heat energy is released, causing melting of the contact surfaces under high impulse pressure, which provides a high degree of welding. A combination of magnetic-pulse and plasma technologies is also effective, which makes it possible to replace expensive detonation technologies. It is noted that the effective operation of the generator is important to select the operating frequency.

The problem of determining the optimal frequency is posed and solved, and based on the results obtained, a nomogramma is built. For illustration an example of determination of the optimal frequency of installation having given parameters and operating at optimal frequency (when maximum pressure is developed) is given by this diagramma.

Keywords: Strong impulse magnetic field; Capacitor battery; Inductance; Inductor; Pressure on the surface of metal; Working frequency; Optimal frequency.

Journ. "Energy" №3 (505), 2017. P. 76-85

On the partial discharge method diagnostics of electrical devices

Sh. Nemsadze

Resume

Significance and modern trends of development of the technical diagnostics of contemporary electrical power installation is marked. The paper discusses partial discharges processes taking place in electrical isolation and the electrical model of isolation is compiled. The basic parameters of the model and characteristic values of partial discharges are shown. Apparent charge measuring electric circuits are compiled and the range of possible variations of apparent charge of installation are given. Using the results of measuring of apparent charges possibilities of diagnostics and prognosis of operating parameters of electrical installation are shown

GTU's Works No. 2 (504), 2017
