

「ロシア・旧ソビエトにおける電波ばく露基準とロシアにおける環境電磁工学技術」

<http://cobalt.cneas.tohoku.ac.jp/users/sato/EMC-ISTC.htm>

期日 10月25日(土) 13:30-17:00

会場 仙台国際センター、小会議室1 <http://www.sira.or.jp/icenter/>

共催 東北大学東北アジア研究センター、ISTC、仙台EMC研究センター推進部会

協賛 仙台EMCゼミナール、IEEE EMC仙台チャプタ

旧ソビエトの電波ばく露基準は、非常に厳しかったことが知られています。こうした基準に関する技術的、歴史的背景を解説していただくと共に、現在のロシアにおける基準について紹介をいただきます。また環境電磁工学技術の紹介、研究活動、企業化などについても解説をいただきます。

参加は無料です。

講演は英語で行います。一部ロシア語による講演には日本語通訳をつけます

東北大学名誉教授 佐藤 利三郎

首都大学東京大学院 多氣 昌生 教授

Valentina Nikitina (St.Petersburg State Marine Technical University)

Electromagnetic fields on board ships. Assessment of danger for the crew, hygienic regulation, Russian experience in protection from EMF”.

Nikolay Khokhlov (Limited Liability Company NANODIAGNOSTIKA)

Quasistatic electromagnetic tomography methods and its applications

developed in the Institute for Radioengineering and Electronics (Moscow, Russia)

Nina Rubtsova (Research Institute of Occupational Health of Russian Academy of Medical Sciences)

Power frequency electromagnetic fields: biological effects, hygienic standardization, methods of control and protection. Experience of Russia

Alexander Worshevsky (ELEMCOM)

EMC standardization in Russia

Nikolay Chubinsky (Moscow Institute of Physics and Technology)

The shaper of high-voltage ultra wideband pulses for an exposition of cellular tissues

関連して以下の講演会にもご参加ください。 <http://cobalt.cneas.tohoku.ac.jp/users/sato/EMC-ISTC.htm>

(1) 10月22日 (水) 13:30-16:30 東北大学 東京分室 (東京駅北口 サピアタワー10階)

主催 ISTC、協賛 東北大学 東北アジア研究センター

参加無料、ただし事前登録が必要です。

(2) 10月24日 (金) 米沢 (山形大学)

環境電磁工学研究会 (EMCJ) ・マイクロ波研究会 (MW) (10月23,24日)

<http://www.ieice.org/~emcj/jpn/>

共催 電子情報通信学会 マイクロ波研究会、環境電磁工学研究会 (EMCJ)、IEEEEMCS仙台チャプタ

会場 山形大学ベンチャー・ビジネス・ラボラトリー セミナーホール

問い合わせ先： 東北大学 東北アジア研究センター 佐藤 源之
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講演概要

Valentina Nikitina (St.Petersburg State Marine Technical University)

Electromagnetic fields on board ships. Assessment of danger for the crew, hygienic regulation, Russian experience in protection from EMF”.

Statistics shows that no less than two thirds of accidents in the water transport take place due to false actions of the navigators and crews of ships (human factor). This report considers the problems of hygienic assessment of electromagnetic fields on board ships, possible role and significance of the electromagnetic factor in ensuring the navigation safety. The unfavorable electromagnetic situation on board ships (in premises and on open decks) is formed by the changed natural electromagnetic background and EMF radiation of technical aids. First of all, these are electro-energetic systems, which are the sources of low frequency magnetic fields. The highest levels of magnetic fields are registered at watch posts in the premises of the power compartment. There is a problem of irradiation of the crew by radiofrequency EMF produced by the antennas of radars and marine radio communication transmitters on the open decks. Investigations on hygienic assessment and biological effect of modulated EMF produced by the marine radioelectronic aids were performed in the Soviet Union. As a result of the complex studies the maximum permissible EMF levels were developed. The sanitary-epidemiological rules and norms «Electromagnetic fields on board navigation vehicles and at marine objects. Hygienic safety requirements» were put into effect in 2006. The Federal special program “Development of civil marine technical aids for 2009-2016” is adopted in Russia. The section of the document “Marine technical aids operation safety” notes the need to lower the degree of human exposure to electromagnetic fields”. The international standards (IMO, ISO, IES and others) determine only operational requirements to the equipment. According to our opinion, today it is necessary to develop an International standard establishing the unified requirements to providing electromagnetic safety of ship crews.

Nikolay Khokhlov (Limited Liability Company NANODIAGNOSTIKA)

Quasistatic electromagnetic tomography methods and its applications developed in the Institute for Radioengineering and Electronics (Moscow, Russia)

Some new quasistatic tomography methods have been developed for different medical applications in the Laboratory of mathematical methods in radio physics of the Institute of Radioengineering and Electronics of RAS: Electric impedance tomography (EIT)/ Magnetic induction tomography (MIT)/ Electric field tomography (EFT). EIT is the technique enabling to visualize spatial distribution of electrical impedance (or conductivity) inside the human body. The device uses voltage measurements on the object's surface when the electric current passes through the volume, as initial data for the image reconstruction. High accuracy initial electrical data are processed by fast and effective reconstruction algorithms. As the measurements in electrical impedance tomography can be performed rather fast, it enables to visualize many processes (such as heart pulsation) in real time. MIT unlike EIT doesn't requires electrical contacts with the body and uses interaction of oscillating magnetic field with conductive media. The conductivity (and permittivity) can be reconstructed from the measurements of perturbed field outside the objects. The EFT method exploits interaction of high-frequency electric field with inhomogeneous conductive medium without contact with the electrodes. Unlike an electrical impedance tomography no electric current is injected into the medium from the outside.

Nina Rubtsova (Research Institute of Occupational Health of Russian Academy of Medical Sciences)

Power frequency electromagnetic fields: biological effects, hygienic standardization, methods of control and protection. Experience of Russia

Maintenance of population electromagnetic safety under power frequency (50 Hz) electromagnetic fields (EMF) makes a significant problem, especially regarding of magnetic component (MF) effects. In RF hygienic norms of occupational and general public power frequency (PF) EMF exposure are more strict than in another countries. Regular studying of PF EMF exposed staff health state has been begun in 60th in our country. Now more and more high urgency is represented with a question of possible adverse (including carcinogenic) effects of PF MF to general public, mainly, children. For the control of PF EMF created by various sources, settlement and tool methods

are used. There are various PC programs, that allow calculate of EF and MF levels. 3 principles are applied for person' protection: Protection by time. / Protection by distance. /Protection by protective means. (EF protective means should correspond to 2 GOST./ In case of impossibility of PF electric and magnetic field reduce for maintenance of permissible limit values in staff workplaces, and in places of general public residing, power equipment technical improvement, allowing reduce of EMF intensity, is possible.

Alexander Worshevsky (ELEMCOM)
EMC standardization in Russia

Federal agency of technical regulation is the national competent body in Russia. EMC law is under consideration. Technical Committee (TC EMC) prepares national EMC standards. Specialists from different institutes and organizations work in Technical Committee. There are many subcommittees. Russian Maritime Register of shipping set EMC requirements for shipboard equipment. Many EMC standards have become mandatory. Standards are used to prove EMC properties of products. Basic and generic standards are based on IEC standards. Many product family and product standards have been renovated. The equipment of potential hazardous objects such as ships, railroad, nuclear power plants has the highest immunity. The standards require 10 immunity tests for shipboard and 16 tests for nuclear power plant equipment. The test level is higher then the level used in generic standard for industry environment. New current tests in grounding wires are mandatory. Immunity test of the whole system after an installation will be determined. EMC test equipment are produced in Russia. There are accredited laboratories for EMC tests in accordance with national and international EMC standards. Some laboratories have unique equipment for lightning and high level electromagnetic field tests.

Nikolay Chubinsky (Moscow Institute of Physics and Technology)
The shaper of high-voltage ultra wideband pulses for an exposition of cellular tissues

From the middle of the last century numerous investigations of effects from influence of electromagnetic fields on alive organisms carrying out. Except for only scientific questions any tasks were solved. First, those problems connected with development of specifications on maximum permissible levels of an irradiation of the person and animals, and second, with definition of possible therapeutic effects of such influences. The huge number of experiments in the broadest range of frequencies with use of constants electric and magnetic fields, of variable electromagnetic fields, of pulse fields, etc. has been carried out. Such experiments proceed and now, that reflects their urgency today. Last decades the new direction in the experimental researches has appeared. It connected with use for an irradiation animal ultra wideband (UWB) pulses. Such works are conducted in several Russian institutes. Research fellows of the Moscow Institute of Physics and Technology (MIPT) have been involved in works of this scientific direction. For the stand intended for researches of reactions of cellular cultures on pulse low-frequency electric influences the shaper of high-voltage UWB pulses has been developed. It includes two mainframes: actually the shaper of electric pulses nanosecond duration with amplitude 5-20 kV and a radiator for creation in the cuvette volume with cellular tissues of pulse fields of known amplitude. In the report results of development special UWB radiator for generation in volume of cylindrical temperature-controlled cuvette of homogeneous electromagnetic field are brought.