INSTITUTE OF THERMOMECHANICS AS CR, v. v. i.

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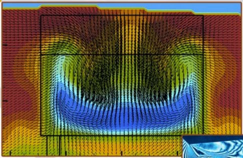
The Institute of Thermomechanics is a public research institution of the Academy of Sciences whose basic research is focused on the area of applied physics. Current research is focused on fluid dynamics, thermodynamics, dynamics of mechanical systems, mechanics of solids, material diagnostics and on the solution of interdisciplinary problems, especially the interaction between fluids and solids, environmental aerodynamics, biomechanics and mechatronics, and also on research in the area of electrical power engineering systems with an orientation on electrical machines, devices, and other equipment from the perspective of their physical parameters, dynamics, control, and operating media. A considerable part of the scientific attention in recent years has been dedicated to applied research, e.g. the development of new materials and technologies, the biomechanics of man and ecology.

The Institute of Thermomechanics was established in 1953 as the Laboratory of Mechanical Engineering CSAV, which was renamed as the Institute for Mechanical Engineering in 1955. The name Institute of Thermomechanics CSAV was used from 1962 and was followed by the Institute of Thermomechanics AS CR after the division of Czechoslovakia. In 2006 the Institute was united with the Institute of Electrical Engineering AS CR, which was also established in 1953.

The research section of the Institute is made up of eight research departments and their laboratories, which operate in the main building in the AS CR office complex on the Mazanka campus in Prague and in four branch offices in Plzeň, Brno, Prague and Ostrava, which arose as joint offices with the universities.

Department of Fluid Dynamics

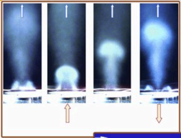


The activity of the Department is primarily focused on the basic research in the field of fluid mechanics, though attention is also paid to some special applications of this field. Research is primarily conducted experimentally, in close collaboration with laboratories providing mathematical modeling for the experiments. Work pertaining to the development of special experimental methods and the related instrumentation is also an integral part of the research.

Problems concerning the transition from laminar shear flow to turbulent flow and the structure and development of turbulent flow are studied in the **Laboratory of Turbulent Shear Flows**. The conditions for formation and development of “coherent structures” and issues relating to the stability of laminar shear flows are analysed. This issue is studied within “complex flows,” which are various cases of simple flow interactions (e.g. fluid jets and cross streams) or the interaction between a fluid flow and a body (e.g. fluid circulation around a cylinder or an elastically-fixed airfoil). Recently, the work in the laboratory has focused on purposeful control of flows in order to achieve an optimised structure from the perspective of turbulence or boundary layer detachment. Special experimental methods, based on the use of hot-wire sensors and optical principles (PIV), are also used and developed in the laboratory.

The **Laboratory of Internal Flows** is oriented on the study of flows in closed ducts. A particular emphasis is placed on the study of transonic flow, the effects of shock waves and their interaction, the issue of secondary flow in curved ducts, unsteady phenomena in a flow field, the study of mixing fluid flows, etc. Many mysteries that influence the quality of energy transformations in fluid flow machines in this problem are still unknown. Therefore the results of this research are often closely and directly connected to the design of flow parts of such machines (turbines, compressors, valves…) and finally lead to an increase in efficiency and reliability. The laboratory uses many unique experimental and measuring instruments, including the Mach-Zehnder interferometer.

Department of Thermodynamics



Modern thermodynamics encompasses much more than conversion of energy. It includes many fields such as physics, chemistry, biology, meteorology and more, requiring interdisciplinary collaboration.

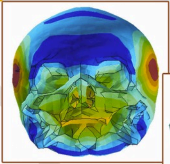
In the **Laboratory of Thermophysical Properties of Fluids** we research the density, thermal conductivity and surface tension of interesting fluids such as new, environmentally friendly refrigerants or ionic liquids, which have surprising characteristics. Another field of thermodynamics we are concerned with is phase transitions, e.g. transitions of a liquid into a gas and vice versa.

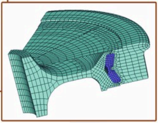
In the **Laboratory of Phase Transition Kinetics** we study the progress of phase transitions with respect to time, especially during the formation of a phase, otherwise known as nucleation. We are interested in condensation – here we mean the creation of atmospheric aerosols and their use in power engineering – and cavitation, leading to the erosion damage of pumps.

The research in the **Laboratory of Heat and Mass Transfer** is concerned with flow and temperature fields in fluids, especially for passive and active thermal and flow control as well as heat and mass transfer intensification. Experimental research of impinging, pulsatile, and synthetic jets (see top figure) is conducted on the macro and micro-scale. Microfluidics (flow control, cooling and mixing on the chip-scale) is of particular interest. A fundamental problem studied in the laboratory is non-isothermal vortex shedding (see the von Kármán vortex street in the lower figure).

Thermodynamics also has its place in our bodies. In the **Laboratory of Biomechanics** we model the body as a thermodynamic system including the main function of blood circulation and the special effects given by the elasticity of blood vessel walls. We are also interested in the thermodynamic aspects of the chemical reactions which give strength to the heart muscle the heart muscles its strength and the friction properties of joints and joint endoprotheses.

Department of Dynamics and Vibrations





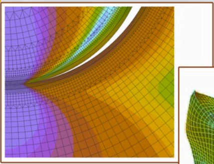
The Department is focused on basic research in the area of the theory and development of numerical and experimental methods for the study of the dynamics of mechanical systems and elastic bodies, with a special regard for the identification and vibrodiagnostics of complicated and nonlinear systems and problems of interaction between flowing fluids and oscillating bodies.

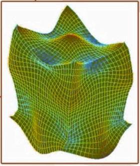
The **Laboratory of Modelling and Identification of Dynamical Systems** is engaged in the identification and tuning of complex and mechatronic dynamical systems, the mathematical and physical modelling of these systems, and their optimisation. The mathematical models are considered to be linear with the corresponding spectral and modal characteristics, weak and stronger nonlinearities, and applications in the dynamics of machines with an emphasis on rotational machines with both classic and contactless bearings and various physical fundamentals.

The **Laboratory of Vibrodiagnostics and Nonlinear Dynamics** is focused on the methods for monitoring vibrations and dynamic loading of machine elements during rotation, the vibrodiagnostics of rotating machines, the vibroacoustic properties of mechanical systems, and numerical simulations of the vibrations of nonlinear systems. Dynamic behaviour with thermo-mechanical coupling is modelled for damping elements made of thermoviscoelastic materials. The stability of motion, the regions of chaotic and other irregular motions, and the nonlinear interaction of oscillating dynamical systems with a source of vibration energy and external electromechanical systems, are under study in the analytical and numerical simulation of nonlinear, time-variable mechanical systems.

The **Laboratory of Fluidelasticity** is engaged in the development of methods for the study of the interaction of flowing fluids and deformable bodies and their verification in aerodynamic tunnels. Attention is paid to the vibration characteristics and stability limits of aerohydroelastic systems, the modelling of acoustic-structural couplings of vibrating bodies in interaction with acoustic media and the modelling of aeroelastic interactions in the biomechanics of the human voice.

Department of Impact and Waves in Solids





The Department consists of three closely collaborating laboratories.

The **Laboratory of Experimental Stress Analysis** provides experimental data on transient phenomena associated with stress wave propagation in solids. These are typically generated by impact loadings delivered by air gun projectiles, exploding wires technique, by different types of impactors or by a focused ruby laser beam. Measurements are gained through both coherent optics methods (such as double-pulse holographic interferometry, electronic speckle interferometry or laser vibrometry) and dynamic responses measured by semiconductor strain gauges or accelerometers. Some methods and procedures developed are used, for example, in non-destructive defectoscopy, construction and the automobile and armament industries. Attention is also paid to the use of these methods both in injury biomechanics and criminal traceology, among other areas.

The **Laboratory of Computational Solid Mechanics** is engaged in the analysis of nonlinear static and dynamic problems using the Finite Element Method (FEM). These techniques are used in the field of contact and impact of deformable bodies accompanied by geometric and material nonlinearities. Furthermore, wave propagation in heterogeneous and anisotropic environments, studied by analytical and numerical methods, and the evaluation and comparison of FEM models with experimental results, are also fields of interest. In addition to this, studies are carried out on defects in crystalline materials experimentally, using the molecular dynamic method, and on the electronic structure and total energy calculations of non-periodic systems, using FEM or pseudopotential.

The **Laboratory of Ultrasonic Methods** deals with both experimental and theoretical research in the field of mechanics of materials. It is oriented on the utilisation of physical acoustic principles for the evaluation of mechanical properties of metals, intermetallics, ceramics, composites, and functional materials (ferroics) as well as the characterisation of structural changes and material damage. For this purpose, the laboratory develops original ultrasonic methods, such as resonant ultrasound spectroscopy, acousto-optical methods, etc.

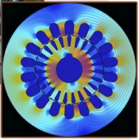
Department of Environmental Aerodynamics

Research in the Department is focused on the processes in the atmospheric boundary layer. For example, the processes taking place during the flow and transport of anthropogenic substances through the atmosphere, the pollution dispersion from stationary and mobile sources (traffic), and the effects of accidents or terrorist attacks connected with the release of dangerous substances into the atmosphere are studied.

Models describing the aforementioned processes and numerical methods resolving the equations of motion and boundary conditions were proposed for the mathematical modelling method. A special aerodynamic tunnel was built, where various modelling methods have been proposed and sophisticated experimental methods are used for physical modelling. For example the visualisation method is used with a laser knife for qualitative studies. A Laser Doppler Anemometry system is used for the quantitative measurement of flow characteristics, while an Flame Ionisation Detector analyser is used for concentration measurements.

The proposed methods were used when resolving a wide variety of practical problems. For example, the general pattern or characteristics of atmospheric flow and pollution dispersion from automobile traffic in an urban area were studied and specific problems, such as pollution in the centre of city of Hanover, were studied. Furthermore the extent of the air pollution from airborne lead particles that escaped from Kovohutě a.s. Příbram's smokestack was determined. The extent of the accident connected with the escape of chlorine from Synthesia a.s. Semtín was estimated for in order to prepare an evacuation for the inhabitants of the Pardubice agglomeration. The threat to the inhabitants around the Old Town Square in Prague in the case of a terrorist attack was also estimated by this method. A model of the Old Town Square made in the Institute of Thermomechanics AS CR is in the left figure. The figure on the right shows the visualization of the flow in the street intersection of the idealized urban area using the smoke and laser sheet visualization system.

Department of Electric Machines, Drives and Power Electronics

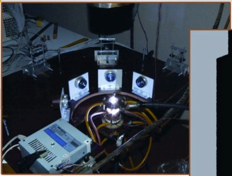


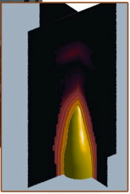
The Department is engaged in the analysis and modelling of electric drives and rotating machines along with the experimental verification of the achieved results. The most important methods for the conversion of mechanical energy into electrical energy and vice versa are analysed. Research is also focused on current problems connected with the circuit structures of power electronic converters and algorithms of the digital control and diagnostics of these converters. The mutual effects of power electronic converters with both the machines that are supplied from them and the supply networks to which they are connected are analysed.

Considerable attention is given to systems with doubly fed machines that can operate at variable speeds and are thus perspective generators for wind and hydro power plants. The possibility of setting suitable speeds makes the energy conversions more efficient, improves the technical parameters, and extends the lifetime of the machinery. The goal of increasing the reliability of variable-speed drives is to propose measures for keeping a drive in operation even if some of its components fail. A related area of research is the compensation of unbalanced three-phase power supplies of semiconductor converters that can, in practice, result in the significant deterioration of the operating characteristics of electric drives.

Advanced control algorithms of AC drives are developed and tested experimentally with prospective utilisation in industry and traction. A power supply from multilevel frequency converters is developed for these drives. Studies focus on the unfavorable high-frequency phenomena (EMI) due to operation of the converters. Models of the individual components of the drives, also valid for high frequencies, are proposed and experimentally verified. As far as the electromagnetic compatibility (EMC) in electric power engineering and the quality of electrical energy are concerned, algorithms are developed to control the active power filters with the goal being to compensate for higher harmonics, unbalanced loads, power factor and flicker, and to control energy flows in transmission, distribution, and industrial networks.

Department of Electrophysics



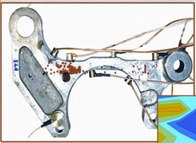


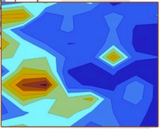
The Department is engaged in basic research concerned with nonlinear and unsteady processes important for the proper and efficient operations of various electrical devices.

In the **Laboratory of High-Temperature Gas Dynamics** experimental research is focused on dynamic phenomena and coherent structures in electrical arcs and in thermal plasma plumes including the interaction of these structures with injected particulate matter, the solution of the Boltzmann kinetic equation, and the application of kinetic theory to the calculation of transport coefficients in high temperature gasses. During most of the experiments, thermal plasma is generated by an electrical arc in a plasmatron. Optical methods, primarily utilizing high-speed CCD cameras and multichannel systems using optical fibres and photodiodes, are used to monitor the plasma plume at the plasmatron outlet. Scanning from multiple directions makes the spatial reconstruction of the dynamic processes in the plasma plume possible with a high temporal resolution. Correlation analysis methods, Fast Fourier Transforms, wavelet analyses, and correlation dimension calculations are used to process the experimental data obtained.

In the **Laboratory of Coupled Problems in Electrical Engineering** advanced versions of numerical methods are developed for the solution of physical fields. These are primarily higher-order finite element methods with automatic adaptivity, supplemented with technologies of hanging nodes and independent discretisation meshes for the individual physical fields as well as some integral methods. These methods are then applied to the solution of selected coupled problems in the area of electrical power engineering, electromagnetic compatibility, and several other technical problems. The modelling of physical processes during thermal processing of solid and liquid metals that are controlled by an electromagnetic field (induction heating, induction hardening, electromagnetic hot pressing, levitation melting, the mixing, pumping and dosing of liquid metals and other technological procedures) is particularly at the forefront of interest.

Department of Nondestructive Testing



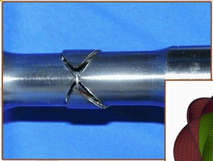


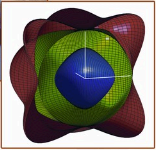
The Department is focused on the research, development and application of new non-destructive testing methods and the assessment of materials and structures. Diagnostics without breaching or disassembling components are important for increasing the safety, reliability, and lifespan of high-stressed structural components. Monitoring conditions makes it possible to identify the occurrence and progression of defects with time and to prevent failure or collapse of a structure.

Research is primarily oriented on methods based on the propagation and detection of **ultrasonic waves** in bodies. One of these methods monitors acoustic emissions, i.e. waves originating during crack propagations, plastic deformations, etc. Piezoelectric transducers localise the source of the emissions signalling the progression of defects on a structure. Artificial intelligence (neural networks, etc.) is used to identify the sources. Hidden defects in unloaded materials are identified using ultrasonic imaging, including tomography. Current developments include nonlinear elastic wave spectroscopy (NEWS), which is up to a thousand times more sensitive than classic ultrasonic or X-ray defectoscopy. NEWS methods are based on nonlinear phenomena during the ultrasonic excitation of bodies with defects, where the frequency response depends heavily on the excitation amplitude. Especially promising are procedures with nonlinear wave modulation, where the examined specimen is excited by several ultrasonic frequencies or procedures with time reversal mirrors, which utilize the symmetries of wave effects against time reversal.

These methods have a wide application in industrial and medical diagnostics. The experimental research is supported by numerical simulations of elastic wave propagation in bodies. The results are used for the interpretation of the measured data, the training of neural networks, etc. Furthermore, theoretical work is focused on new signal processing algorithms. The results are applied in the diagnostics of aerospace construction, nuclear and standard power plants, the chemical and petrol-gas industries, civil engineering, and many other fields. Another specific area of research is the biomechanics and ultrasonic diagnostics of human skin tissue for medical and cosmetic purposes.

Centre of Material Diagnostics





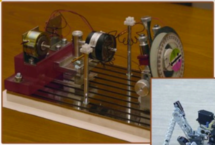
The Centre was established in Pilsen on April 1st, 1997 as a branch office of the Institute of Thermomechanics. Its activities are focused on the research of the dynamic damage of materials and diagnostic methods for the resulting defects. The office is comprised of two laboratories.

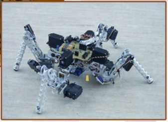
The **Laboratory of Wave Modelling in Solids** is engaged in the modelling of stress wave propagation in solid bodies. The work in the laboratory is directed at: the development of scientific analytical wave propagation methods in simple bodies, the complex analysis of the non-stationary stress state of shells and flat bodies under the influence of geometrical discontinuities, the numerical and experimental stress state analysis of nuclear waste container models under drop tests, the measurement of elastic wave dispersion curves in model bodies, the proposal of calibration instruments for acoustic emissions and the proposal, and analysis of piezoelectric transducers for the measurement of displacements on body surfaces. In recent years the laboratory has also been involved in the development of parallel algorithms and visualisation tools for the molecular dynamics method.

The **Laboratory of Fatigue Damage** is oriented on the experimental and numerical research of fatigue damage of materials, fatigue life, and crack propagation. The work in the laboratory is directed at: the fatigue of materials, the optimisation of dynamically stressed structures with regard to fatigue life, multiaxial fatigue, the estimation of the fatigue life of real machine components, and the fatigue life of parts with surfaces covered by thin coatings. The laboratory equipment makes it possible to apply uniaxial harmonic loading or random loading of computer-controlled specimens and biaxial combined stress both in harmonic or random loading mode. The auxiliary free actuators make it possible to test parts of real structures while simulating actual load during operations.

The Centre collaborates closely with the University of West Bohemia in Pilsen on educating undergraduate and doctorate students and on joint research projects.

Centre of Mechatronics





The Centre is a joint office of the Institute of Thermomechanics AS CR and the Faculty of Mechanical Engineering at the Technical University in Brno. The Centre is focused on theoretical and applied research in mechatronics and biomechatronics using computational and experimental modelling.

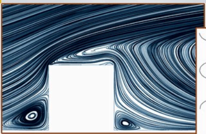
The **Laboratory of Mechatronics and Robotics** is oriented on the research of mechatronic systems from the perspective of mechanics, electrical engineering, and information technologies. For example, the problem of intelligent control, the development of artificial intelligence algorithms, and their application for selected technical systems, are studied here. The development of robotic systems (autonomous locomotion robots and walking robots) is another area of research.

In the **Laboratory of Nonlinear and Stochastic Mechanics**, research is focused on the dynamic behaviour of nonlinear systems. This research is concerned with stability, bifurcation behaviour, and conditions for the origin of chaotic behaviour in mechatronic systems. The results are applied primarily to propulsion systems. Considerable attention has recently been paid to mechatronic systems with small motors and prospectively with micromotors.

Research in the **Laboratory of Biomechanics and Biomechatronics** is mainly focused on computational modelling, the goal of which is to increase the reliability of joint endoprotheses for large human joints and the analysis of isolated myocardium cell behaviour. In the case of hip joints, computational modelling is used to study the problem of resurfacing replacements, the analysis of contact stress between the stem of the endoprothesis and the bone and the influence of the contact surface shape deviations on stress in the ceramic head. For the elbow joint, the problem of influence from the deviation in inserting the endoprothesis into the bone on the stress in the system is studied.

The Centre provides instruction in bachelor studies in Engineering and Mechatronics as well as in masters studies in Mechanical Engineering and Mechatronics and the education of scientists in the Engineering Mechanics doctorate study programme at the Faculty of Mechanical Engineering of the Brno University of Technology.

Centre
of Power Engineering

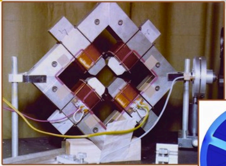


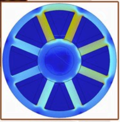
The Centre of Power Engineering is a joint office of the Institute of Thermomechanics AS CR and the Faculty of Mechanical Engineering of the Czech Technical University in Prague. The Centre is focused on basic research in fluid mechanics and thermodynamics, primarily with applications in engineering, power engineering and environmental protection. Research projects are oriented predominantly on mathematical and experimental modelling of flow in internal aerodynamics. In addition, the Centre contributes to the education of scientists in the Mechanical Engineering doctorate study programme in the fields of Mathematical and Engineering Physics, Thermomechanics, and Fluid Mechanics and Power Engineering. The Centre is comprised of two laboratories.

In the **Laboratory of Thermal Turbomachines** both wet steam flow with heterogeneous phase transition and transonic flow in ducts and blade cascades are examined experimentally. A mobile expansion chamber, enabling measurements in steam turbines under laboratory conditions, was developed for the experimental investigation of heterogeneous admixtures in water vapour. The examination of transonic flow in blade cascades is focused primarily on the development of new high-power steam turbines in cooperation with ŠKODA Power in Pilsen.

The **Laboratory of Computational Fluid Dynamics** is engaged in the development of numerical methods and mathematical models for the simulation of incompressible and compressible flow of viscous fluids and the numerical modelling of transition and turbulent flows in internal and external aerodynamics (flows in ducts and blade cascades, flows around airfoils) and flows in the atmospheric boundary layer including the modelling of pollutant dispersion. The influence of a pressure gradient, flow turbulence, and surface roughness on the development of a flow including the transition from laminar to turbulent flow as well as any flow separation that significantly influences the efficiency of an entire turbine or compressor, is studied in various applications in the framework of experimental and numerical flow. The atmospheric boundary layer and the processes connected with flow in the atmosphere and the dispersion and propagation of harmful substances in the atmosphere are modelled in the area of environmental aerodynamics.

Centre of Smart Systems and Structures



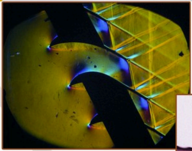


Work in the Centre of Smart Systems and Structures is oriented on theoretical and experimental research in the area of coupled multi-physical problems and problems connected with the identification of atmospheric pollution. The department is divided into two laboratories.

Research in the **Laboratory of Modelling of Coupled Multi-Physical Problems** is concentrated on the phenomena connected with the damping of mechanical vibrations and their interaction with the surroundings and on the application of computer modelling methods in this area. Attention is primarily paid to the damping of lateral vibrations of rotors mounted in hydrodynamic bearings, active magnetic bearings, classical squeeze film dampers, and squeeze film dampers working with magnetorheological liquids. The principal results are mathematical models and computer algorithms. Research is oriented on mathematical modelling of a number of physical phenomena such as gas and vapour cavitation in fluid film bearings and squeeze film dampers, on the distribution of a magnetic field in the magnetic bearings, on the influence of a magnetic flux on the yielding shear stress of magnetorheological liquids and their flow in the gap of magnetorheological dampers, on the impacts between the rotors and their stationary part or the force transmission and wave propagation between the rotors and their surroundings, and on the implementation of these phenomena in the mathematical models for rotor systems. The main goal is to develop tools for the analysis of steady-state and transient vibrations of rotors, for the determination of their critical speed and for the evaluation of the character, stability and bifurcation of their oscillations.

The **Laboratory of Modelling of Atmospheric Phenomena** investigates the problems connected with occurrence, dispersion, and changes of the stable and reactive minority components of the atmosphere. Work here is concentrated on the development of the laser spectroscopy method and on its use for research of the physical-chemical processes taking place in the atmospheric boundary layer and for the combustion of various substances. Assessing the risks connected with atmospheric pollution is also part of this research.

Aerodynamic Laboratory



The Aerodynamics Laboratory was built during the late 1950's and early 1960's not far from the town of Nový Knín at the site of a former gold mine. The abandoned mine galleries and high rock cover from algonkian gold-bearing slate make up the sufficiently large, and also sufficiently sealed, vacuum storage that is used for the propulsion of suction-type wind tunnels. The vacuum storage is suctioned off by three water-ring vacuum pumps with an overall wattage of 165 kW; the maximum vacuum achievable is about 10 kPa. The resulting pressure gradient (with respect to atmospheric pressure) in the test facilities allows for maximum velocities to be achieved, exceeding twice the speed of sound.

The centre primarily investigates the flow of viscous and compressible fluids in closed channels, i.e. flows in models of machine parts (radial and axial turbines and compressors), flows from nozzles, diffusers, valves and ejectors. The laboratory also investigates boundary layer problems and aeroelasticity, which studies the mutual influence of oscillating bodies and flowing air.

The largest aerodynamic tunnel is used for the research of two-dimensional prismatic blade cascades for turbines and compressors in a wide range of incidence angles and at velocities at the inlet or outlet ranging from Mach 0.2 to Mach 2, including the problematic region around Mach 1. The test section is 160 mm wide with an adjustable height, which can be set between 250 and 450 mm depending on the adjusted angle of the blade cascade. It is equipped with a semi-automatic traversing mechanism behind the blade cascade used to measure the loss coefficient and a unique Mach-Zehnder interferometer used for quantitative optical measurements and flow visualisation. As a result, the development of transonic flow in blade cascades and detailed measurements of turbine blade behaviour at extreme incidence angles were first viewed and described here. Altogether, more than 100 transonic blade cascades of various types were measured, including the blading of the 1000 MW last-stage steam turbine for the Temelín nuclear power plant, where the loss coefficient was significantly decreased based on these measurements.

Further Information

Acta Technica

The Institute of Thermomechanics AS CR, v. v. i. publishes the international reviewed journal Acta Technica (formerly Acta Technica CSAV), which has been a multidisciplinary periodical since 1956. It focuses on power electronics, mechatronics, thermodynamics, hydromechanics, materials engineering, mechanics of solids, and plasma physics. Now it is also publishing interdisciplinary contributions, e.g. oriented on nanotechnology and bioelectromagnetics. It is published quarterly in English with about 460 pages a year. The domestic and international distribution of the journal is provided by the editorial team, which is governed by the Editor-in-Chief headquartered at the Institute of Thermomechanics AS CR, v. v. i. in Prague. The journal is published under the auspices of the Academy of Sciences of the Czech Republic.

Engineering Mechanics

Engineering Mechanics is a journal published by an association of the same name, which is comprised of fourteen members from the institutes of the Academy of Sciences, faculties and research institutes. The Institute of Thermomechanics AS CR, v. v. i. being one of them. The mission of the journal is to publish original works, short technical announcements, and publication searches in mechanics. In addition to general themes of mechanics of solids, fluids, mechatronics, and from thermodynamics, the contributions also deal with special problems, such as dynamics and stability, modern computational methods, and more. The journal is published in English six times a year. The editorial office is located at the Faculty of Engineering Mechanics of the Brno University of Technology.