Coherent structures in the flow inside a model of the human vocal tract with self-oscillating vocal folds

Jaromír Horáček, Petr Šidlof, Václav Uruba,
Jan Veselý, Vojtěch Radolf, Vítězslav Bula

Abstract. The measurement of the airflow in a specially developed 1 : 1 scaled complex physical model of the voice production is described. This model consists of simplified models of the trachea, the self-oscillating vocal folds and the vocal tract with acoustical spaces that correspond to the vowel [a:]. The measurement set-up enabled to use the Particle Image Velocimetry (PIV) method for description of the airflow-pattern and synchronous vocal fold vibration visualization, acoustic and pressure measurements. The results are presented for the subglottal pressure and airflow rates in the range of normal human phonation. Especially, Coanda effect of the glottal jet and coherent structures showing large eddies in the glottal region of the vocal tract are studied.

Back to Contents

Separation bubbles dynamics in turbulent boundary layer separation region

Vladislav Janeček, Václav Uruba

Abstract. Dynamical behavior of a turbulent boundary layer separation is analyzed from experimental data acquired using Time-Resolved Particle Image Velocimetry method. Special attention is paid to occurrence and behavior of separation bubbles. The analysis of those structures is carried out with respect to both space and time features.

Back to Contents

Langmuir double probe RF plasma compensation using simulation method

Aasim A. Azooz, Demiral S. Akbar, Sinan Bilikmen

Abstract. A possibility of removal of radio-frequency contamination of double Langmuir probe voltage-current characteristics is investigated. Computer simulation of this contamination indicates that the undistorted characteristics can be obtained by proper software treatment of experimental data, which eliminates the need of using filters or other hardware procedures for radio-frequency compensation purpose. User-friendly MATLAB-based software performing such compensation is suggested. Experimental data obtained from double-probe measurements of inductively coupled radio-frequency plasma at several pressures, power levels and positions are analyzed using this technique.

Back to Contents

On solution of laminar flow instability using Orr–Sommerfeld equation

Stanislav Knotek, Miroslav Jícha

Abstract. A special treatment of the boundary conditions for boundary value problem was used for solving the hydrodynamic instability problem described by the Orr–Sommerfeld equation. The procedure is based on the Chebyshev collocation method and was implemented in MATLAB. The results computed for the Poisseuille flow and for Blasius and Pohlhausen velocity profiles show a good agreement with the results reported in literature.

Back to Contents

Comparison of point-to-plane, point-to-point and "cometary" corona discharges for decontamination of surfaces

Vladimír Scholtz, Jaroslav Julák,
Vítězslav Kříha

Abstract. The decontamination of surfaces by low temperature plasma generated in the DC corona discharge of an open-air type in the point-to-plane, point-to-point or cometary arrangement was studied. Three types of inhibition zones were observed, which indicates different mechanisms of action for the point-to-point, point-to-plane and "cometary" discharges. This knowledge may be important in the future selection of the microbicidal agents and in the development of efficient methods for low-temperature plasma decontamination or sterilization.

Back to Contents

Free vibration of non-homogeneous orthotropic visco-elastic circular plate of linearly varying thickness

Arun K. Gupta, Neeri Agarwal

Abstract. Free vibration of a non-homogeneous orthotropic visco-elastic circular plate with linearly varying thickness in the radial direction is analyzed. The density of the plate is assumed to vary linearly in the radial direction. The governing differential equation is solved by the method of separation of variables. An approximate, but convenient frequency equation is derived by using Rayleigh–Ritz technique with a two-term deflection function. The deflection (at two different time levels), time period and logarithmic decrement for the first two modes of vibration are computed for the above plate with clamped edge conditions for various values of non-homogeneity and taper constant. The results for the Voigt–Kelvin model are shown in tabular form.

Back to Contents

Usage of vibrations for diagnostics of moving parts of electrical machines

Yuri Gyzhko

Abstract. Analysis and processing of vibration signals measured on moving parts of electrical machines using a diagnostic information-measuring system based on the Bluetooth wireless standard for transmission of measured data from moving parts of electrical machine is discussed.

Back to Contents