

**Some solutions of the problem of plane steady flow of a gas condensate mixture through a porous medium**  
Dinariyev O.Yu., *Fluid Dynamics*, 1996, 31/2 (268-273). In English.

The plane problem of steady two-phase flow of a multicomponent mixture through a porous medium with phase transitions is considered. It is shown that the system of equations for the two-phase multicomponent flow process, together with the equations of phase equilibrium, can be solved in quadratures if the solution of two auxiliary problems is known. These are the problem of conformal mapping of the neighborhood of a well onto a rectangle and the purely physicochemical problem of the description of the mechanical and thermodynamic properties of a mixture. The solutions for a vertical well with a barrier and for a horizontal well in a finite productive stratum are found under certain assumptions concerning the properties of the mixture.

**Subsonic gas-liquid cavitation flow past a disk**

Zigangareeva L.M. & Kiselev O.M., *Fluid Dynamics*, 1996, 31/2 (334-338). In English.

The problem of axisymmetric subsonic gas-liquid cavitation flow past a disk in accordance with the Riabouchinsky scheme is solved. Formulas relating the main flow parameters with the cavitation number, the Mach number on the free boundary and the gas/liquid volume ratio under stagnation conditions are presented.

**Stokes waves on a cavity surface in a rotating fluid**

Amromin E.L., *Fluid Dynamics*, 1996, 31/6 (886-890). In English.

The axisymmetric flow of an inviscid incompressible fluid rotating about a cavity with constant pressure is considered. Due to the centrifugal force, on the cavity surface waves may exist, in particular, waves with a break in the wave base where the cavity meridional sections form the angle  $2\pi/3$ , i.e. Stokes waves. A method of finding these waves from the boundary-value problem for the fluid velocity potential is described. For an infinite cavity, the dependence of the wave parameters on the cavitation number, calculated using the pressure in the cavity, is given.

**(Ultraschalleinsatz in der Trinkwasseraufbereitung, Inaktivierung von Plankton - Entwicklung und Bau einer technischen Anlage) (Ultrasound and the treatment of drinking water: inactivation of plankton - development and construction of a technical system)**

Mues A., *GWF Wasser-Abwasser*, 1996, 137/14 Spec. Iss. (S167-S172). In German.

Experiments in the field of zooplankton elimination during the drinking water purification cycle have shown that plankton can effectively be eliminated by applying a combination process of inactivation, flocculation, and filtration. Because of its purely physical inactivation with few side effects, ultrasound was demonstrated to be an excellent choice of technology. To transmit the technology to an actual field project, it was necessary to develop and construct a system capable of continuously treating water quantities of up to 4000 m<sup>3</sup>/h with acoustic cavitation. The development led to a cavitation module for the inactivation of plankton with a capacity of 400 m<sup>3</sup>/h, that was successfully tested at the Wahnbachtalsperrenverband near Köln.

**(Une approche lagrangienne pour la simulation d'interactions particule/particule en écoulement) (Lagrangian approach for the simulation of particle interactions in two phase flows)**

Berlemont A., Chang Z. & Gouesbet G., *Houille Blanche*, 1996, 51/1-2 (57-63). In French.

Hydrodynamic interactions between particle pairs are studied following sedimentation theory. For two spheres, interactions are directly obtained through the resistance matrix which links interaction forces to particle relative velocities. For more than two spheres, the mobility matrix is estimated with a four order approximation on the particle distance, and then it is inverted to get the resistance matrix. A set of motion equations is then solved to describe the particle behaviours.

**Recommendation of small hydraulic turbine types**

*Hydro Power and Equipment*, 1996, 4/- (66-69). In English.

Specifications and applications of small types of hydraulic turbines are summarized. The following turbines are described: S-type, Kaplan, Francis, Banki, Pelton and Turgo. Turbine efficiencies, cavitation and applications are discussed.

**Experimental investigations of the conditions of the onset of air entrainment by plunging liquid jets**

Fetisov Yu.M., *Hydrotechnical Construction*, 1996, 30/2 (87-91). In English.

Intense air entrainment occurs at the place of contact of a plunging jet with the surface of a stationary liquid. The entrained air reduces the eroding capacity of a deflected or free-falling nappe when joining pools of hydraulic structures and decreases cavitation erosion of structural members. Jet aeration is finding wide use for saturating water with oxygen or air to improve its quality and for intensifying biological wastewater treatment processes. It was established that air entrainment can occur under conditions when the average jet velocity at the point of incidence reaches a certain value. The value of this velocity is called the minimum or critical air-entrainment velocity. An analysis of works pertaining to the subject of investigation indicates the complexity of interaction of the plunging jet with the liquid surface, the contradictoriness of theoretical approaches, and limitedness of experimental data. This article gives the results of experimental investigations of the conditions of onset of air entrainment by vertical jets issuing from smooth, long nozzles.

**Hydropower requirement of the Zagorsk pumped-storage station: design features and operating experience**  
Kuleshov A.P., Magruk V.I., Mart'yanov S.I., Rodionov V.G., Khutoryanskii S.A. & Cherepanov M.M., *Hydrotechnical Construction*, 1996, 30/4 (184-191). In English.

This hydroelectric power station features vertical mixed-flow pump-turbines of the RONT-115/812-V-630 type from the Leningrad Metals Plant. The two-machine layout operates in the reversible mode. This article discusses in detail the design and operation of the pump-turbine including the runner, turbine shaft and seal,

gate apparatus, servo motor, thrust and guide bearings. Cavitation resistance depends on the correct selection of runner blade geometry, accuracy of manufacture and machining quality. Cavitation erosion and associated vibration problems are detailed. A number of protective coatings were tested and results are reported. It is concluded overall that the design is correct and the pump-turbine has operated reliably, however, some design improvements to the end seals are suggested.

**Information-analytical support of reliable operation of power facilities: computer program for hydraulic calculation of structures for controlling aeration of the flow on spillways**

Semenkov V.M. & Saranchev V.O., *Hydrotechnical Construction*, 1996, 30/5 (234-242). In English.

A computer program is presented for calculating the hydraulic performance of structures and controlling aeration of spillway flow. Cavitation occurrence, cavitation erosion of the spillway surface and aeration of the flow are important in improving the design of a high-head spillway. The program can be used to optimize the design parameters of a system for anticavitation protection of a high-head spillway which consists of a sequence of aerators.

**Predicting the reliability of runner pits of diagonal-flow and adjustable-blade turbines**

Dzyubanov E.M., Dmitriev N.Yu., Klimovich V.I., Levin S.M. & Shtil'man V.B., *Hydrotechnical Construction*, 1996, 30/2 (59-68). In English.

An analysis of documents and on-site inspections at several hydrostations has revealed many causes of hydro-power equipment failure, especially related to runner pit damages. The principal causes of damage are discussed: fatigue cracking with cavitation erosion, cavitation-erosion damage resulting in cracking, and fatigue failure due to defects in metal, manufacturing and assembly. Factors influencing this damage and the reliability of the runner pit are examined.

**Titanium - first choice for desalination plant heat exchangers**

McCue D.M. & Peacock D.K., *Industrial Water Treatment*, 1996, 28/4 (44-52). In English.

The advantages of titanium for desalination plant heat exchangers are discussed. Problems of corrosion and erosion in heat exchanger tubes are considered. The replacement of heat exchanger internals with prefabricated all titanium modules is described. The corrosion resistance of titanium is discussed particularly to microbiologically influenced corrosion, pitting, erosion and cavitation, stress corrosion cracking, fatigue, fouling, crevice corrosion, galvanic corrosion and corrosion fatigue. The economics of corrosion prevention in different plant layouts are considered.

**Flow characteristics of sage and peppermint leaves**

Martinov M., Babic M. & Adamovic D., *International Agrophysics*, 1996, 10/4 (289-293). In English.

The separation of the desirable parts of a medicinal plant in air flow is a widely applied procedure. Therefore there has been established the goal to measure flow characteristics of sage (*Salvia officinalis* L.) and peppermint (*Mentha piperita* L.) leaves. Leaves were picked from stem and classified according to dimensions in four (sage) and three (peppermint) fractions. The flow characteristics defined by the air velocity of fluidization of a material layer show the possibility of separating sage leaves and stems, due to a significant difference in velocity values,  $1.75 \text{ m s}^{-1}$  maximum for leaves and  $3.35 \text{ m s}^{-1}$  for stems. Due the difference in flow characteristics the separation of different peppermint leaves fractions is also possible.

**An experimental investigation of critical flow rates of subcooled water through short pipes with small diameters**

Moon-Hyun Chun, Choon-Hyung Park & Jee-Won Park, *International Communications in Heat and Mass Transfer*, 1996, 23/8 (1053-1064). In English.

Critical two-phase flow rates of subcooled water through short pipes ( $L < 400 \text{ mm}$ ) with small diameters ( $D < 7.15 \text{ mm}$ ) have been experimentally investigated for wide ranges of subcooling ( $0-199^\circ\text{C}$ ) and pressure ( $0.5-2.0 \text{ MPa}$ ). Experimental results that show effects of various parameters on subcooled critical two-phase flow rates are presented in the form of graphs such as the dimensionless mass flux versus the dimensionless subcooling curve. An empirical correlation expressed in terms of a dimensionless subcooling is also obtained for subcooled two-phase flow rates through present test sections. Comparisons between the mass fluxes calculated by present correlation and a total of 679 selected experimental data points of 9 different investigators show that the agreement is fairly good except for very subcooling data obtained from small  $L/D$  (less than 10) orifices.

**Heat transfer from a horizontal tube in a magnetofluidized bed**

Saxena S.C. & Dewan S.S., *International Communications in Heat and Mass Transfer*, 1996, 23/5 (655-664). In English.

Heat transfer coefficient values are reported for a horizontal Nylon 24.1 mm diameter heated probe immersed in an iron shot bed of  $1511 \mu\text{m}$  average diameter and exposed to an external uniform magnetic field collinear with the fluidizing air velocity. Total and local heat transfer coefficients are measured at different axial and angular positions over a range of air velocity and magnetic-field intensity values. The bed is also characterized by its hydrodynamic properties, viz., minimum fluidization and bubbling velocities and mean bed voidage.

**Analysis of influence of physical parameters on vapor-liquid flow behavior up to dryout in a heat-generating porous medium**

Kim S., *International Communications in Heat and Mass Transfer*, 1996, 23/8 (1097-1107). In English.

In the present work the influence of various physical characteristics on the two-phase flow behavior in a self-heated porous medium has been studied using a numerical model, that is, the effects of heat generation, rate of porosity, of particle size, and of system pressure on the dryout process. To analyze the effect of these characteristics, the variation of both liquid volumetric fraction and liquid axial velocity is evaluated at the steady state or