INTERNATIONAL JOURNAL OF
FLUID MECHANICS RESEARCH

ISSN: 1064-2277 Print

XML **Year 2012**, Volume 39 / Issue 2

DOI: 10.1615/InterJFluidMechRes.v39.i2

Pages: 95

DOI: 10.1615/InterJFluidMechRes.v39.i2.10

Editorial Note

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DOI: 10.1615/InterJFluidMechRes.v39.i2.20

Flow Dynamics, Crisis Phenomena and Decay of Falling Wavy Liquid Films during Boiling Incipience and Evaporation at Nonstationary Heat Release

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ABSTRACT
Results of experimental studies and numerical simulation of flow dynamics, heat transfer, character of boiling-up, and crisis phenomena development are presented for falling wavy films of cryogenic liquid (nitrogen) and water under the intensive transient heat generation. Step-wise and periodic pulsing heat release was supplied on the vertical plane constantan foil of the 25 μm thickness and 40 mm length. When loading thermal impulses of a high intensity, nitrogen film decay is determined by dynamic characteristics of propagation of the self-maintained front of liquid boiling-up and the shape of structures, formed during its development. The effect of heat flux density on the time of boiling-up expectation and structures of evaporation fronts is shown for different Reynolds numbers. According to new experimental data on decay dynamics of falling wavy films with transient heat generation for subcooled water, the crisis phenomena development is significantly effected by the condensation effect at boiling incipience.

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DOI: 10.1615/InterJFluidMechRes.v39.i2.30

Flow Dynamics, Heat Transfer and Crisis Phenomena in the Films of Binary Freon Mixtures, Falling over the Structured Surface

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ABSTRACT
This paper presents the experimental results on heat transfer and hydrodynamics of the falling films of binary mixtures on the surfaces with complex geometry. The vertical aluminum tubes of the 50 mm diameter with smooth and textured surfaces were used as the test sections. The binary Freon mixture R21/R114 of different compositions was used as the working fluid. The range of the film Reynolds number alteration was 70 to 700. The wave surface evolution of the falling liquid film and the process of dry spot formation were recorded by the high-speed digital video camera. Results of investigation of the wave surface structure, measurements of heat transfer coefficients and dynamics of dry spot formation on the heated surface with corresponding critical heat fluxes are shown in this paper.

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DOI: 10.1615/InterJFluidMechRes.v39.i2.40

Fluid Flow through Macro-Porous Materials: Friction Coefficient and Wind Tunnel Similitude Criteria

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ABSTRACT
This work reports the study of airflow fluid through macro-porous materials. Several perforated plates having holes with different geometry, thickness and size were tested in a wind tunnel. The objective of this paper is double fold. At first, it aims at clarifying the effect of configuration of pores (holes) on fluid flow. Friction resistance and drag coefficients are obtained. Secondly, it has the purpose to present a comprehensive similitude criterion for macro-porous structures based on physical insight.

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DOI: 10.1615/InterJFluidMechRes.v39.i2.50

Applicability of the Forchheimer Equation to Forced-Aeration Windrow Composting: Variation of Airflow Characteristics with Humidity and Volatile Solids

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ABSTRACT
This paper reports on experimental and analytical research in the field of forced-aeration windrow composting. The adequacy of a non-Darcy flow equation to describe flows through organic porous media is discussed. The windrow permeability and inertial parameter are determined and related with the substrate moisture and volatile solids contents. Another aspect studied is the

transient variation of airflow characteristics and compost density. Comparisons between the analytical model and measurements are also made.

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DOI: 10.1615/InterJFluidMechRes.v39.i2.60

CFD Simulation and Grid Study of a Cavitating Orifice Flow

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ABSTRACT
A cavitating flow through an orifice is investigated by the use of computational fluid dynamics (CFD) with an ANSYS CFX solver. Turbulence is described by the Menter shear stress transport (SST) model, mass transfer due to cavitation by the Rayleigh−Plesset based default cavitation model. A grid study following the best practice guidelines known from literature has shown as not sufficient enough for the simulation of a cavitating flow. When refining the grid monitor values e. g. the mass flow rate reached convergence at a certain amount of elements, whereas the cavitation zones itself changed in shape and location until a significantly high resolution is reached. The SST turbulence model calculates the boundary layer with a wall function approach at high YPLUS values and resolves it at small YPLUS values. The accuracy of the simulation was increased by avoiding the use of the wall function approach.

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DOI: 10.1615/InterJFluidMechRes.v39.i2.70

Aero-Acoustical Analysis of the Wake Flow of a Cylinder

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ABSTRACT
A flowed cylinder creates a tonal noise through the turbulences created in the backlash of the cylinder. The main frequency of this noise can be predicted by analytical method using the Strouhal Number. With numerical CFD calculations the flow can be analysed and via the acoustical analogy (Lighthill, Ffowcs-Williams – Hawkings (FW-H)) the sound generation of the turbulent flow can be calculated. The results of a CFD calculation are compared to the analytical prediction using the Strouhal Number. In addition, these results are compared to measurements with an acoustic camera.

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DOI: 10.1615/InterJFluidMechRes.v39.i2.80

On Generalized MHD Double-Diffusive Convection in Completely Confined Binary Fluids

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ABSTRACT
The hydromagnetic instability of binary, Boussinesq and electrically conducting fluids completely confined in an arbitrary region bounded by rigid walls in Stern's geometry, with both the Soret and Dufour effects included has been studied in the present

paper. Some general qualitative results concerning the character of marginal state, stability of oscillatory motions and limitations on the oscillatory motions of growing amplitude, are derived. The results for the horizontal layer geometry in the present case follow as a consequence.

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