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Grabchenko's International Conference on Advanced Manufacturing Processes

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Book of Abstracts

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This book reports on topics at the interface between manufacturing engineering, mechanical engineering, and materials science. It pays special attention to advanced manufacturing processes, CAD/CAE/CAPP/CAM systems for design, manufacturing and assembling technologies, information management systems for manufacturing enterprises, automation and robotics, intelligent manufacturing systems and Industry 4.0 strategy. Engineering design and optimization, computational techniques in machine mechanics and dynamics, numerical methods for dynamics, acoustics, and vibration, as well as methods and technologies for additive manufacturing, resource-saving, and energy-efficient technologies, are also among the topics discussed in the book. Based on the Grabchenko's International Conference on Advanced Manufacturing Processes (InterPartner-2019), held on September 10-13, 2019, in Odessa, Ukraine, the book promotes research activities to intensify scientific information interchange between researchers, developers, engineers, students, and practitioners. The conference is an ideal platform for people to share views and experiences in Engineering related areas.

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Two-phase Turbulent Flow in the Separation Channel with an Oscillating Wall

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In this research work, hydrodynamic peculiarities of turbulent gas-dispersed flow were considered. Analysis of the existing assumptions and simplifications for modeling the process of turbulent transfer of dispersed particles in turbulent two-phase flow was carried out within the theoretical study of the dispersed particle motion in gas flow. As a result of the analytical solution, the trajectories of dispersed particles have been obtained. The dimensionless criterion for determining geometrical features of particles' trajectories has been discovered. The dependences of the particle entrainment rate and overflow index on the diameter of dispersed particles were obtained. These dependencies are confirmed by the formulas determined previously by Brandt, Freund, and Hideman based on studying the vibration and acoustic impact on turbulent flow. The obtained results can also be applied to determine the Lagrangian frequency of turbulent pulsations by geometrical features of particles' relative trajectories as Lissajous figures. Finally, the turbulent migration phenomenon for dispersed particles in gas-dispersed flow between vibrationally-weighted layers in the direction from the vibrating wall to the stationary one has been proved analytically.

The Determination of the Effort for Pushing the Flexible Strip upon the Surface of a Horizontal Cylinder

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A differential equation of the motion of a flexible incompressible strip with a rectangular cross-section curve along the inner rough surface of a horizontal cylinder has been derived. The strip moves with a given constant speed up perpendicularly to the generatrix of the cylinder, that is, the trajectory of movement is the cross-section curve of the cylinder. The equation takes into account the weight forces of the strip, the friction forces from the resulting pressure force of the strip on the surface, as well as the additional friction force depending on the compression of the strip and the angle of its coverage with the cylinder. An example for a circular cylinder is considered. The differential equation is solved, the necessary force for pushing the strip is found. The graphs illustrating the influence of different factors on the pushing force of a strip at a given angle of its coverage are constructed.

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