요철이 설치된 채널에서의 복합 열전달 해석

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Conjugate Heat Transfer Analysis in a Ribbed Channel

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Key Words: Conjugate Heat Transfer (복합열전달), Immersed Boundary Method(가상경계법), Effective Conductivity(유효열전도도), Large Eddy Simulation (큰에디모사)

Abstract : Numerical Simulations are performed to analyze the conjugate heat transfer of turbulent flow in a ribbed channel with conducting solid wall. An immersed boundary method is used to figure out the heat transfer effect in the solid region on that in the fluid region in an unitary computational domain. In order to satisfy the continuity of the heat flux at the solid-fluid interface, an effective conductivity is introduced. A large eddy simulationtechnique is used to predict turbulent flow. Results show that heat flux is concentrated to the rib below the channel wall and flows outward mainly around the edge of the rib. However, the local Nusselt number shows no significant difference with the pure convection case.

열전탐침과 시편사이의 열전달 해석을 통한 국소 열물성 측정기법 평가

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Evaluation of Local Thermal Property Measurement Schemes Through Heat Transfer Analysis between Thermoelectric SThM Probe and Sample

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Key Words: Scanning Thermal Microscope(주사탐침열현미경), Thermal property(열물성)

Abstract : We developed two local thermal property measurement schemes using a thermoelectric SThM probe with sub-micron resolution, laser heated probe measurement (DC mode) and AC current heated probe measurement (AC mode). To understand and evaluate the two measurement schemes, we analyzed the heat transfer phenomena between thermocouple probe and sample using 1-D heat diffusion model. AC mode performed better in localized thermal property measurement. This is because the conduction through air of AC mode turns out to be less than that of DC mode. Using the 1-D heat diffusion model we predicted the influence of the thickness of metal film deposited on the probe and the effect of vacuum on the performance of SThM probe.