Discrete Inlet Slits를 가지는 Spiral 제트유동에 관한 연구

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The Study of the Spiral Jet Flow with Discrete Inlet Slits

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Key Words: Compressible Flow(압축성 유동), Coanda Effect(Coanda 효과), Spiral Jet(Spiral 제트), Tangential Velocity Component(접선 속도 성분)

Abstract : Although spiral jet technology is widely being applied in a variety of industrial fields, detailed flow mechanism inside the spiral nozzle is not well understood yet. According to the previous works, the spiral flow components are generated by non-uniform inlet velocity distributions or pressure disturbances at the annular inlet of a convergent nozzle. However, this fact has never been clarified by experiment or computational method. In the present study, the three-dimensional Naver-Stokes equations are solved using a fully implicit finite volume method. The effect of discrete inlet slits on the spiral jet flow is investigated and validated with previous experimental data available. The results obtained show that, at any position near discrete inlets, two vortices with a co-axial and tangential velocity components of the opposite direction were generated and, near the nozzle exit, changed to a vortex with those of one direction.

다공벽을 전파하는 약한 충격파에 관한 수치해석적 연구

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A Computational Study of the Weak Shock Wave Propagating along a Perforated Duct

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Key Words: Compressible Flow(압축성 유동), Perforated Wall(다공벽), Shock Wave(충격파), Supersonic Flow(초음속 유동), Unsteady Flow(비정상유동)

Abstract : A computational analysis has been conducted to attenuate the shock wave propagating a perforated duct. The pressure histories and detailed flow structures are analyzed for the range of the incident shock wave Mach number between 1.02 and 1.12. Computational results using the two-dimensional, unsteady, compressible, Navier-Stokes equations are validated with the shock tube experiments. The incident shock wave attenuates when it propagates along the perforated duct, eventually changing to a sound wave. It is found that behind the incident shock wave, the pressure strongly fluctuates due to the shock wave diffraction and reflection processes. A empirical formula is obtained by computational results in order to predict an attenuation of the tunnel impulse waves.