횡류수차의 유효낙차 변화에 따른 성능 및 내부유동

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Performance and Internal Flow of Cross-Flow Hydro Turbine by Effective Head

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Global concerns about environmental issues such as a greenhouse effect are increasing gradually. Quantity of emission of carbon dioxide by Hydro-Power Plants is smaller than those by power plants of other renewable energy sources. Manufacturing costs of hydro turbine is relatively very expensive because the structure of hydro turbine is very complex. Therefore, cross-flow turbine is adopted in this study because of its simple structure and high possibility of applying to small hydropower. The result shows that as effective head increases, tangential and radial flow velocities increase and thus, the increased tangential velocity contributes to the increase of angular momentum and output torque.

Key words : Cross-flow hydro turbine(횡류수차), Small hydropower(소수력), Performance(성능), Internal flow(내부유동), Effective head(유효낙차)

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CFD을 이용한 프란시스 수차의 내부유동 해석

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Performance Analysis of Francis Turbines by CFD

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The conventional method to assess turbine performance is its model testing which becomes costly and time consuming for several design alternatives in design optimization. Computational fluid dynamics (CFD) has become a cost effective tool for predicting detailed flow information in turbine space to enable the selection of best design. In the present paper, Francis turbine of commercial small hydropower plants which is under 70kw is investigated. Solutions are investigated with respect to the hydraulic characteristics against an outward angle of guide vane, the number of guide vane and head (inlet velocity). By suitable modification of the runner shape, low pressure zone on the leading edge can be reduced. If the entire runner is to be optimized in this manner, flow simulation tests have to be carried out on a series of different geometrical shape

Key words : Renewable energy(신재생에너지), Computational fluid dynamics(전산유체역학), Small hydropower(소수력), Runner(러너), Turbine(터빈)

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