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Unsteady Numerical Analysis of Sediment Erosion Affected High Head Francis Turbine

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Abstract : Sediment flowing along with the water in rivers flowing in South Asia erodes the turbine components. The erosion of turbine components is influenced by the nature of fluid flow along with components of typical turbine types. This paper examines two cases of high head Francis turbines with the same speed number numerically. The numerical investigation involves both steady-state and transient analysis of the numerical model developed for both cases. Furthermore, the influence of leakage flow from the clearance gap of guide vanes is also examined and compared with no leakage flow. It presents the added pressure pulsation to rotor-stator-interaction in the turbine runner for both cases due to leakage flow. It was also found that leakage flow was a major contributor to the sediment erosion in those turbines.

Keywords : sediment erosion, Francis turbine, leakage flow, rotor stator interaction
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