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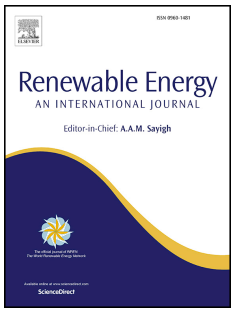

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A New Low-Cost Swirler for Axial Micro Hydro Turbines of Low Head Potential

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Abstract:

This paper presents a new design process of a low-cost swirler employed in axial micro-turbines. The swirler is simple in design, inexpensive and easy to produce and has good adaptability to different potential conditions without major changes. The blades are shaped from trapezoid-shaped steel sheets curved to a certain radius to form a tin airfoil with suitable outlet angle distribution from hub to tip. The formed blades are then welded between two concentric rings to form a round cascade. Correction from flow to blade angles, namely induced incidence and trailing edge deviation angles, were calculated by CFD analysis and considered in blade shape design. The manufactured prototype made on the bases of numerical computations shows a micro unit efficiency comparable to the highest in the market, yet with much less complexity and manufacturing cost. The innovative low-cost swirler leads to 70/60 percent cost/weight reduction.

Keywords:

Micro-Hydropower, Turbomachinery, Axial Flow Turbine, Swirler, Free Vortex Method, Computational Fluid Dynamics.