

**DESIGNING A PROTOTYPE VORTEX
INDUCED VIBRATIONS BASED HYDROELECTRICITY
GENERATING SYSTEM**

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Degree of Master of Science

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University of Moratuwa

Sri Lanka

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Thesis/Dissertation submitted in partial fulfillment of the requirements for the degree
Master of Science in EI

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Abstract

With the inevitable concerns on energy crisis and environmental pollution, various types of alternative energy resources such as, hydro, wind, solar, tidal, wave, etc., have been harnessed using various novel technologies. Among all of them vortex induced vibrations (VIV) based hydro energy has identified as one of the most favorable source of energy, which has a better potential and the most environmentally benign forms of electricity generation.

Vortex induced vibrations is a technique, which makes linear motions from the water flow. The VIV based hydro electricity generation system can be operated in low speed water streams where the turbines cannot be used. Also, the design is cost effective compared to other renewable energy sources.

This research presents designing and implementation of a prototype VIV based hydroelectricity generation technique. The results of the study indicate the capability of generating electricity using the VIV based hydro system, and its applicability in low speed streams in Sri Lanka. The VIV based hydroelectricity generation can be identified as one of the most effective renewable energy sources for Sri Lanka.

Keywords: *Alternative energy source, Hydro electricity generator, Hydro kinetic energy, Linear generator, Low speed flow, Renewable Energy, Vortex Induced Vibrations, VIV.*

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List of Abbreviations

| Abbreviation | Description |
|---------------------|--|
| CFD | Computational Fluid Dynamics |
| EPRI | Electric Power Research Institute |
| MREL | Marine Renewable Energy Laboratory |
| VIV | Vortex Induced Vibrations |
| VIVHEGS | Vortex Induced Vibrations based Hydro Electricity Generating System |