



Fig.1 Pipe type agricultural water



Fig.2 Contra-rotating Small Hydro Turbine

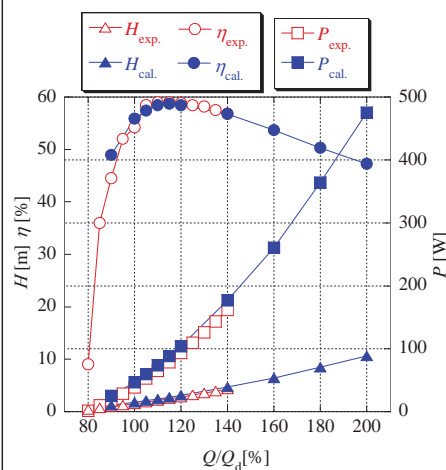


Fig.3 Performance curves

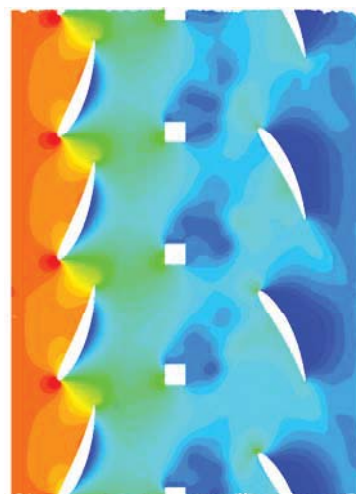


Fig.4 Pressure distributions by CFD

Content:

There is a strong demand to change energy resources of fossil fuels into renewable energy such as hydropower, wind power, solar energy and so on. Small hydropower generation is alternative energy, and there is a significant potential for small hydro turbines. Small hydropower facilities that generate about 100kW-1000kW have spread widely, however, it causes environmental destructions by a foundation construction and a set up of a draft tube. On the other hand, there are a lot of places that can generate about 100W-1kW (pico-hydropower) in agricultural water and a small stream. (Fig.1) Then, there are demands for high performance and wide flow passage. Therefore, we adopted contra-rotating rotors, which could be expected to achieve high performance and enable to use low-solidity rotors with wide flow passage. (Fig.2)

The maximum efficiency $\eta_{max}=59\%$ is obtained around $1.1Q_d$ - $1.2Q_d$, although the contra-rotating small-sized hydro turbine is extremely compact with a 60mm casing diameter. Furthermore, efficiency more than 50% is obtained in relatively wide flow rates range of 95%-180% of the design flow rate. (Fig.3) Now, the internal flow condition is investigated by CFD to improve the performance and realize a stable operation. (Fig.4) I would like to collaborate with a company because a battery and a generator are also key technology of this turbine.

Keywords: Small hydro turbine,
Internal flow, CFD,

E-mail: t-shige@tokushima-u.ac.jp

Tel. +81-88-656-9742

Fax: +81-88-656-9082

HP : <http://power14.me.tokushima-u.ac.jp/kikai/>

