

Design Optimization of Tidal/Ocean Power Generator by Deep Learning

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- Digitalization of measured data



Research Contents Design Optimization of Tidal/Ocean Power Generator by Deep Learning

The Tsugaru strait, in the northern region of Japan, is a narrow channel. This channel concentrates the power of tidal/ocean flow. In this study, we aim to optimize the design values of tidal/ocean power generator in the strait with unidirectional flow, such as the Tsugaru strait, by deep learning.

First, we correct the whole data of the power generator, such as boundary conditions (flow velocity etc.), design values (lengthes, diameters etc.), and specs (production of electricity, volume of sound etc.). Then, the machine learning architecture (Fig.1) learns the relation between each data. Finally, the learned architecture can forecast specs and can determine the design value which would optimize the spec.

Now we are correcting the data by miniature model experiment and are forecasting the relation between velocity field and design values. Fluid field data (Fig.(a)) is stored in tens of thousands of arrays by processing the movie data in the experiment (Fig.2(b)). Deep learning network reads tens of thousands of fluid field arrays and corresponding design value data, and learn the relation. This network can forecast design values even if the unknown fluid field is inputted.

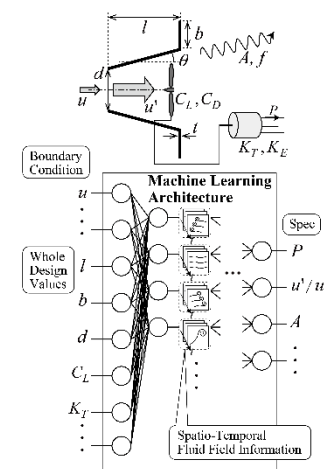


Fig.1 Schematic illustration of machine learning architecture [1].

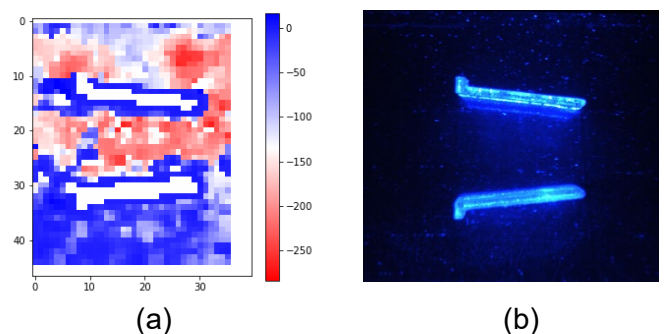


Fig.2 (a)Fluid field data and (b)Original movie data

[1] R. Fujiwara et al., Forecasting design values of tidal/ocean power generator in the strait with unidirectional flow by deep learning.

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Available Facilities and Equipment
