Leibniz Universität Hannover

Institut für Turbomaschinen und Fluid-Dynamik

Bachelor-, Studien-, oder Masterarbeit

Gene Expression Programming for Inferring a Surface Roughness Correlation Based on DNS data

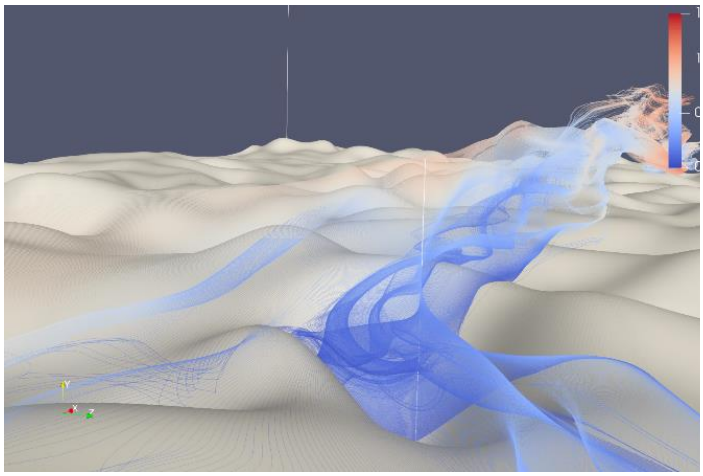

Figure 1: Streamlines over roughness

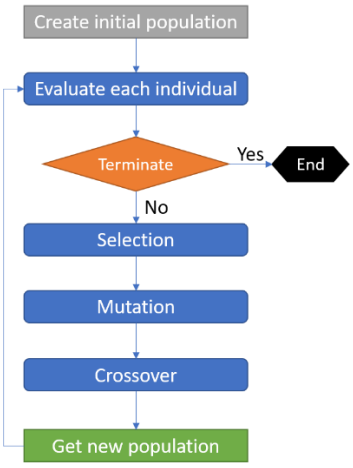

Figure 2: A typical evolutionary algorithm

Background

Understanding the effects of roughness on the flow is crucial for determining the impact on the engine component efficiencies and for making maintenance decisions.

In our institute, data has been collected from direct numerical simulation (DNS) of flow over roughness in plain channels (Figure 1). This invaluable data may be used to construct correlations of roughness function with roughness parameters. The traditional way in this direction is curve-fitting the data with some aid of intuition. Nevertheless, effects of some roughness parameters can go unnoticed. As an alternative and innovative approach, symbolic regression capabilities of Gene Expression Programming (GEP) will be hereby scrutinized (Figure 2). An open-source software is to be utilized for this purpose. The aim is, to infer good fitting expressions for the effect of roughness on the flow.

There had already been some progress on this work. The remaining task is to improve the results using a wider range of data, and to improve the method as necessary. If possible, some contribution to the academic publication planned is also expected.

Responsibilities

- Grasping the theory of GEP,
- Getting familiar with the usage of the software geppy and our driver routine,
- Improving our GEP approach to infer roughness correlations based on a-priori DNS data

Your profile

You are expected to have,

- Preferably, a good command of the python language
- Willingness to work with git/gitlab.
- Willingness to produce scientific work

Contact

If the topic catches your interest, please get in touch with

Dr. Kenan Cengiz

cengiz@tfd.uni-hannover.de

0511/762-2529