

**Studien- oder Masterarbeit**

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

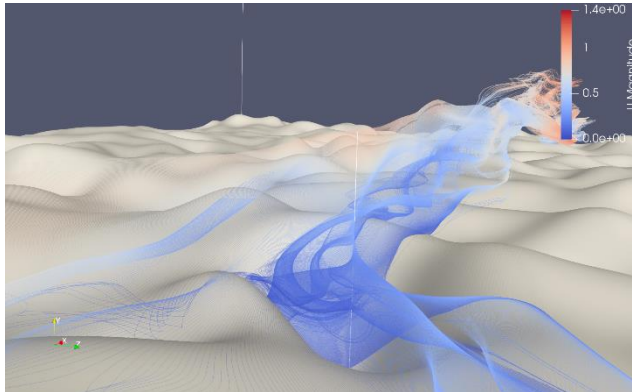


Figure 1: Streamlines over roughness

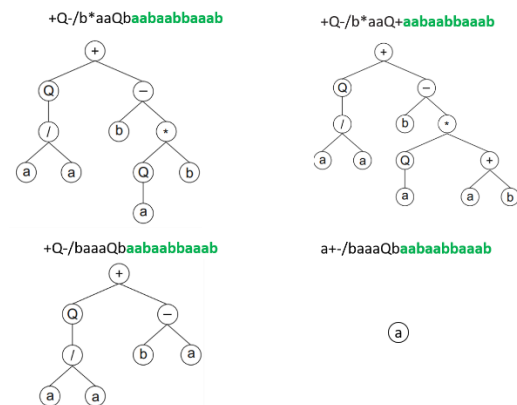


Figure 2: Examples of expression trees

**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, there is an ongoing work on direct numerical simulation of flow over roughness in plain channels (Figure 1). The invaluable information provided by DNS may be used to construct correlations of roughness function with roughness parameters. A common 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. An academic publication is also possible.

**Responsibilities**

- Grasping the theory of GEP,
- Getting familiar with the usage of the software geppy,
- Constructing a 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
- Ideally, some experience with at least one of the following: genetic algorithms, symbolic regression, artificial intelligence
- 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](mailto:cengiz@tfd.uni-hannover.de)

0511/762-2529

**Sebastian Kurth, M.Sc.**

[kurth@tfd.uni-hannover.de](mailto:kurth@tfd.uni-hannover.de)

0511/762-2751