

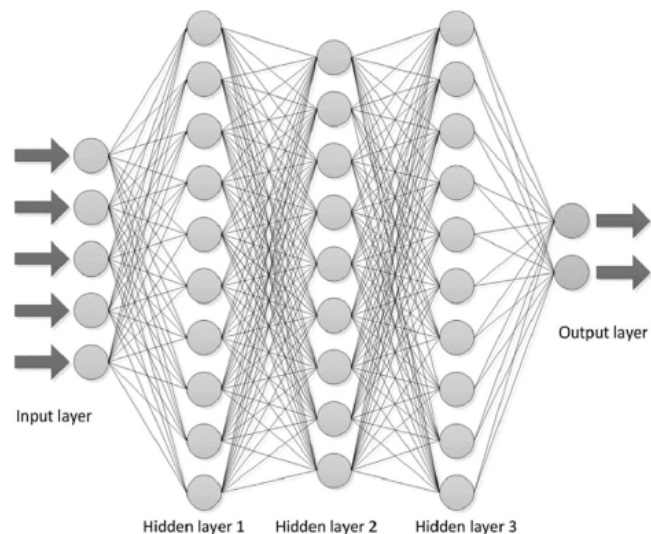
Bachelor/Master/Project thesis

Artificial Neural Network for Shock Problems

Course of study: mathematics/applied mathematics
Kind of thesis: modeling and numerical simulation
Programming language: Matlab or similar
Start: anytime, duration 3-6 months

Problem

The numerical solution of flow problems is often time consuming and the results are still prone to numerical errors that yield slow convergence of the numerical method close to discontinuities of the solution. Thus even simple problems like the one-dimensional flow through a pipe, the so-called shock tube problem, still pose a challenge for numerical methods. In this project, the shock tube problem shall be investigated for one-dimensional Euler equations and a model for a rarefied gas.



Goal

This project's goal is the development of an Artificial Neural Network model for the shock tube problem mentioned above. The Artificial Neural Network will be trained using semi-analytical solutions of the shock tube problem.

Preliminary work

The Artificial Neural Network has been successfully used to model the flow solution of the shallow water equations and only minor modifications have to be made to apply the model to the Euler equations or rarefied gas models.

Task

The development of an Artificial Neural Network model for the shock tube problem includes (e.g.)

- implementation of the analytical solution for the shock tube problem
- identification of test cases for the training of the Neural Network
- computation of analytical test data for training
- comparison of the Neural Network data and the analytical solution

The final tasks will be discussed with the supervisor. Please feel free to get in contact.

Supervision

Contact: **Dr. Julian Köllermeier**
 Address: Institut für Mathematik
 Arnimallee 6, 14195 Berlin
 Room: 016
 Tel.: +4930 838 75368
 Email: koellermeier@zedat.fu-berlin.de

