E-10
Simulation

April 15, 2015

Press Release:

New contest: Simulation of a wolf population by the E-10-Simulation GmbH

Introduction:

In 2011, wolves where sighted in Luneburg Heath for the first time (after quite a long period). The E-10-Simulation GmbH was asked by the Ministry of Food, Agriculture and Consumerism of Lower Saxony to forecast the development of the wolf population over the next 15 years.

Contest task:

The E-10-Simulation GmbH asks all interested students to submit a simulation proposal. The main task consists of modelling the development of the population mathematically, choosing a suitable solver for the simulation, writing a corresponding software program and evaluating the results. Further technical details and specifications are listed in the attachment.

N. Otreal
Chief Executive Officer
E-10-Simulation GmbH

Technical details for the task:

In order to simulate the development of the wolf population you may want to use an easy numerical method. You should focus on the time interval $2011 \leq t \leq 2025$, having an initial population size of 20 wolves. Previous studies of wolf populations suggest that the growth rate of a wolf population is proportional to the current population with a proportionality factor of 0.4055.
Furthermore, we expect that the amount of food is adequate for only 250 wolves. Due to this restriction, the growth rate will also be proportional to $1 - \frac{w}{250}$, where w is the current population.

The task can be accomplished by working through the following steps:

- modelling the growth of the wolf population using ordinary differential equations,
- choosing and describing at least two suitable numerical methods,
- implementing and comparing these solvers,
- evaluating the obtained results with respect to applicability.

Submission:

The submission may consist of a technical report in pdf-format and the corresponding Matlab code. Please prepare your submission as a single zip-archive, named as "Project1_SURNAME". Submissions should be send to our consultant Christian Seifert (christian.seifert@tuhh.de) no later than April 29, 2015 at noon.

Formal specifications:

The technical report should consists of at most 2 pages in DIN A4 format. It should contain at least:

- a section concerning the modelling of the task,
- a section dealing with the analysis of the proposed methods,
- a section describing the results obtained by your code, including an evaluation of the results.

The Matlab code should

- have comments describing the code,
- contain at least an executable Matlab script, which runs the simulation, and
- produce a formatted output.