TU Clausthal

INTERNET TECHNOLOGIES ITIS INFORMATION SYSTEMS

Circus Trapeze simulation
&
Ice Cream Shop simulation
Homework @ Week 02

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Circus Trapeze I - Multi Step Solvers

- **Parameters**
  - Start time, end time, step size, method type.
- **Scenario**
  - Run the simulation by 3 types of methods and show the results on the same graph.
  - Redo that for 3 times with different end time and step size.
- **Design**
  - For the method Euler, do the same as before. Increase by steps.
  - For the method RK2 (Heun), save the current state including X' and calculate the X1' after the next 2 steps. Then based on the current state, calculate the state after the next 2 steps with both X'/2 and X1'/2.
  - For the method RK4, save the current state including X', calculate the X1' after the next 2 steps, calculate the X2' after the next 2 steps with X1' and calculate the X3' after the next 4 steps with X2'. Then calculate the state after the next 4 steps with X'/6, X1'/3, X2'/3 and X3'/6.
- **Results**
  - The graph and the results show us the difference among the 3 methods (Euler, RK2, RK4). RK4 is the most precise, but RK2 is not too worse than it.
  - And, the step size is less, the error is less.

Circus Trapeze II - Adaptive Step Size

- **Parameters**
  - Start time, end time, step size, method type, error threshold.
- **Scenario**
  - The step size would change dynamically until the error between the results with different step sizes is less than the error threshold.
- **Design**
  - Save the current state including the time.
  - Compare next states at the same time with different step size.
  - According to the error, decide to reiterate or continue.
- **Results**
  - The simulation does not work. And the design is a bit of a mess.

Ice Cream Shop Simulation

- **Parameters**
  - Start time, end time, queue mode (number of server), random type
- **Scenario**
  - Single queue with Mike, or with Mike and his assistant.
- **Design**
  - Prepare: a list for information of all Customers, a list for queue, a list for service, a list for Events. Queue mode and random type.
  - Running: Loop for all events until simulation ends. Generating creates Generating or Serving, Serving creates Done, Done creates Serving.
  - Random: normal random, Normal Distribution. (Do tests.)
- **Results**
  - Single Server Single Queue, Multiple Servers Single Queue, Mike Test (Dynamic Servers Single Queue).
  - Single Server Single Queue with Normal Distribution.