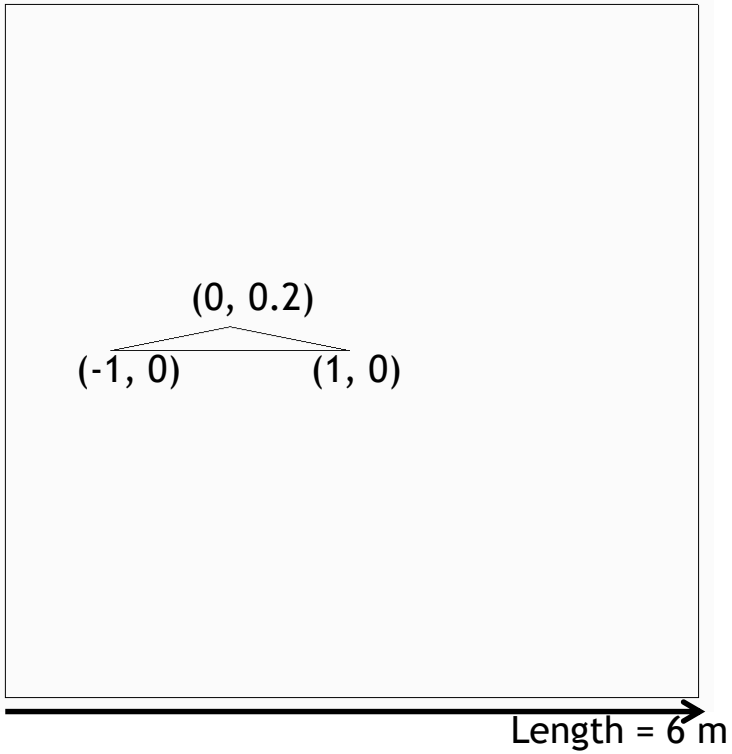
Seeder Exercise

Task 1

- Compute minlevel for 16 fluid elements in length and generate the mesh around a triangle with level of triangle, minlevel+3.

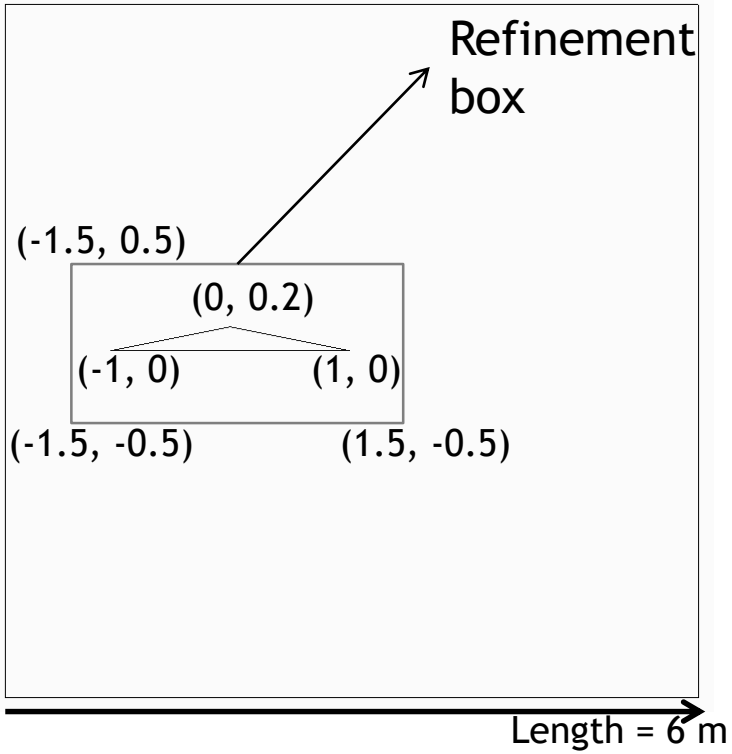


z = [-eps, dx+2*eps]

eps – smallest possible element size at level 20

Task 2

- Place a refinement box according to the dimensions given in the figure
- Set the refinement box level = minlevel+1



z = [-eps, dx+2*eps]

eps – smallest possible element size at level 20

Task 3

- Activate the qVal using `calc_dist = true` in the attribute table of stl “triangle” spatial object.
- Compare the difference between the mesh with and without qVal.

Task 4

- Replace the refinement box with 2 distance refinement to the triangle object for a level offset of 0 and -1. Each with a radius of 10 times the element size on the corresponding level.
- Compare the mesh with `smoothlevels=false` and `smoothlevels=true`

Bonus

- Replace the front and back boundary objects with periodic object

Basic concepts

- Compute the element size (dx):
  - `dx = bounding_cube.length / 2^level`
  - `dx = bounding_cube.length / nElems`
  - `dx_ReqLvl = dx_KnwLvl * 2^( KnwLvl - ReqLvl )`
- Compute the level:
  - `level = math.ceil(math.log(nElems, 2))`
- Compute the bounding cube length:
  - `bounding_cube.length = dx * 2^level`

Step by step procedure

- Login to the training cluster
  `ssh training`
- The folder `$KURS/exercises/hpcfdx6` contains
  - seeder.template - seeder configuration file
  - triangle.stl - geometry file
  - harvester.lua - Seeder-Harvesting configuration file
- Copy the seeder configuration template file and the stl-file:
  `cp -r $KURS/exercises/hpcfdx6 $MYWS`
- Change to the work directory:
  `cd $MYWS/hpcfdx6`

Step by step procedure

- Create the “mesh” and the “harvest” directory
  `mkdir mesh harvest`
- Copy seeder.template to seeder.lua
  `cp seeder.template seeder.lua`
- Edit seeder configuration file
  `gedit seeder.lua`
  - Adapt the mesh folder in the config (or use environment variable)
  - Compute the element size “dx” and the “minlevel” for task 1 and save seeder.lua

Step by step procedure

- Use the job scripts *seed.job* and *visualize.job* to submit your job
- Run seeder to generate the mesh
  `qsub seed.job`
- Run harvester to convert the mesh data to paraview ".vtu" format
  `qsub visualize.job`
- Open Paraview with the generated file (see Visualization)