This document describes the process to generate the turbulence files that Gadget2 will read.

To create the initial turbulence velocity field file, use the script “turbulence\_generator.py”.

The adjustable parameters are:

* n\_velocity\_components: the number of dimensions of the velocity field
* grid\_dim = number of 1D lattice points of the turbulence box. Here, I used 129, so that I can include the end points for the larger simulation box.
* n = Index of the power spectrum

To generate a file of turbulence, simply run in the Terminal “python turbulence\_generator.py”.

The generated file looks like this:

# Turbulent velocity field

# P(k) ~ k^-4

# k\_min: 2

# k\_max: 129

# Dimensions: 3

# Grid size: 129 129 129

3

129 129 129

0 0 0 -1.780099e-07 1.112626e-07 4.756378e-08

0 0 1 -1.704882e-07 1.043961e-07 5.411726e-08

0 0 2 -1.612577e-07 9.841486e-08 5.838096e-08

0 0 3 -1.487260e-07 9.285605e-08 6.305346e-08

However, we need to modify this file a bit. We must remove the first the 8 lines (I do it manually). Then, we must remove the first 3 columns, in order to get a 3-column file. I do this with the script “configure\_turbulence.c”. Within this c-file, the function “normalize\_turbulence” makes the sum of the velocity field to be = 1. This is not needed, but that’s what I did.

Modify the c-file accordingly and run “./normalize\_turbulence.sh”

The 10 files of turbulence I used are named “t0\_vn\_grid.txt”, “t1\_vn\_grid.txt”, etc.