

Tuning the parameters of a mechanistic chain oscillator model to match the Kolmogorov spectrum of turbulence

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Turbulence can be phenomenologically modelled with a mechanistic binary tree, which represents Richardson's energy cascade model: the largest eddies are unstable and break up into smaller vortices and the smallest whirls dissipate the kinetic energy of the flow through viscosity. In this model, the biggest mass represents the biggest whirl and it is connected to smaller masses with springs. At the smallest level, the masses are connected with springs and dampers to the ground in order to dissipate energy. The energy of the mechanistic "turbulence" is quantified by the kinetic energy of the masses, which is transferred through the potential energy of the springs and finally dissipated by the dampers. The aim of the study is to tune the mechanical parameters of the model to approach as precisely as possible the Kolmogorov-spectrum considering the energy dissipation of the system. This is a joint work with Tamás Kalmár-Nagy.

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