A Flexible Turbulent Vector Field Generator

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Analysis and generation of turbulent vector fields is a necessity in many areas, such
as Atmospheric Science. A candidate model of vector field must be flexible enough
to tune some features, such as the spacial distribution of vortices, sinks and sources,
according to physical measures. To achieve that goal, we propose a model that depends
upon a given matricial function called "topolet" and a law of random vectors family.
This model has a hierarchical structure. Its spinal column is a tree: the encoding tree
of the domain where the vector field lives. The sets of vortices, sinks and sources
are driven by some Bernouilli subtrees, directly giving their fractal dimension. At
each node of the tree is attached a rate of energy loose giving the spectral slope. All
those quantities are independantly identifiable on the base of mathematical proofs. A
primitive version of this model have been proposed for generating clouds.