

The Kuramoto Model

Technical report for python numerical project

Paradis Enzo

Student at the university of Bourgogne Franche-Comté
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I Functional requirement of the program

All the functions which are used for the computing or the displaying of the results are called in the main file. At first there are the functions which create the initial values in respect of the parameters set in the settings file, then these values are stocked in data (.dat) files in a directory named "parameters". With these data files, we don't have to repeat the calculations every time we want to test something. Then you have the functions that compute the results (the phase of the oscillators, the complex mean average, and the Shannon entropy), which are stocked in data files in the same directory. And finally there are the functions that display the graphs by using the module `matplotlib.pyplot`. In this section we will describe the functions that create the data files and their data. Firstly the initial data is created through the `class Data` which is in the data file. Finally the computing of the other values is in the `class KuramotoModel` which is in the kuramoto file. The initial data is created by the function `data.init_data(state)`¹:

data.init_data(state="random")		
Description	Input	Output
This function is used to create initial values, stocked in data files in the directory parameters, according to the value of the argument state set by default to state="random". You can create data for random, chimera, inverse, or josephson states.	The argument state is a string. By default it takes the value "random" but you can give it this values : <ul style="list-style-type: none">• "chimera"• "inverse"• "josephson"	This function will retrieve you six data files in the parameters directory, computing in according to the state argument. The data files are : <ul style="list-style-type: none">• "omega.dat"• "theta0.dat"• "K.dat"• "eta.dat"• "alpha.dat"• "tau.dat"

Table 1: function data.init_data()