

Dmitriy Kats

### Complex Ginsburg-Landau equation

May 23, 2018

The complex Ginsburg-Landau equation can lead to pattern formation as shown in this report. This was accomplished by solving the following governing equations in two dimensions:

$$\frac{\partial A}{\partial t} = A + (1 + ic_1)\nabla^2 A - (1 - ic_3)|A|^2 A$$

where  $A(x, t)$  is a complex valued field. This differential equation was solved on a domain of  $L = 128\pi$  in the  $x$  and  $y$  directions. A Pseudo-spectral method with fourth order Runge Kutta method is used to solve the differential equation. The initial data was taken randomly in the range of  $[-1.5, 1.5] + i[-1.5, 1.5]$ . The parameters were chosen such that  $c_1 = 1.5$  and  $0 \leq c_3 \leq 0.75$ .

In the figure below the amplitude of  $A(x, t)$  is plotted.

