Pattern Formation

Chris Kempes

- What properties and processes are “easy” to obtain through physical dynamics alone?

Reaction Diffusion Equations

$$\frac{\partial U}{\partial t} = D_V \nabla^2 U + F(U)$$

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$$\nabla^2 U = \frac{\partial^2 U}{\partial x^2} + \frac{\partial^2 U}{\partial y^2}$$

Reaction Diffusion Equations

$$\frac{\partial U}{\partial t} = D_U \nabla^2 U + F(U, V)$$

$$\frac{\partial V}{\partial t} = D_V \nabla^2 V + G(U, V)$$

Reaction Diffusion Equations

$$U + 2V \rightarrow 3V$$

$$V \rightarrow P$$

Reaction Diffusion Equations

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$$V \rightarrow P$$

$$\frac{\partial U}{\partial t} = -UV^2 + F\left(1 - U\right) + D_u\left(\frac{\partial^2 U}{\partial x^2} + \frac{\partial^2 U}{\partial y^2}\right)$$

Reaction Diffusion Equations

$$U + 2V \rightarrow 3V$$

$$V \rightarrow P$$

$$\frac{\partial U}{\partial t} = -UV^2 + F\left(1 - U\right) + D_u \left(\frac{\partial^2 U}{\partial x^2} + \frac{\partial^2 U}{\partial y^2} \right)$$

$$\frac{\partial V}{\partial t} = UV^2 - \left(F + k\right) V + D_v \left(\frac{\partial^2 V}{\partial x^2} + \frac{\partial^2 V}{\partial y^2} \right)$$

Reaction Diffusion Equations

Find the simulation by Dirk Brockmann and Benjamin F. Maier
that Chris uses here
http://www.complexity-explorables.org/explorables/grayscott/