

Give an example of an equation that would model this situation: the speed of movement is an increasing function of the norm of the gradient, but is bounded by some maximal possible speed.

(One of many) answer:

We want the velocity to be in the direction of ∇V but its magnitude to be bounded.

One example would be:

$$v = \frac{1}{1 + \|\nabla V\|} \nabla V$$

where $\|\nabla V\|$ means the norm of the vector ∇V .

Thus the equation becomes

$$\frac{\partial c}{\partial t} = - \operatorname{div} \left(\alpha c \frac{1}{1 + \|\nabla V\|} \nabla V \right)$$

for some constant α .