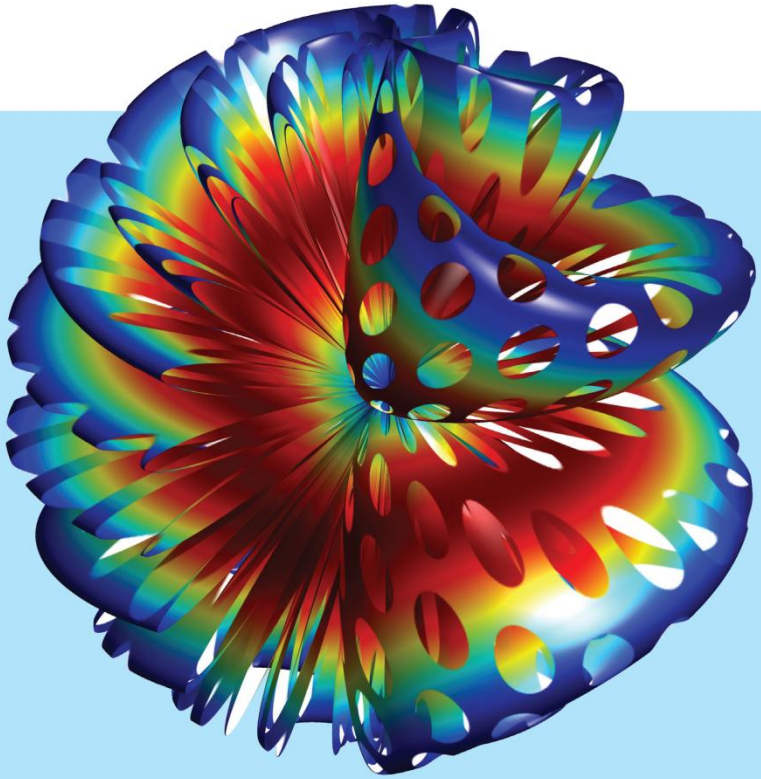
SCIENCE BY SIMULATION

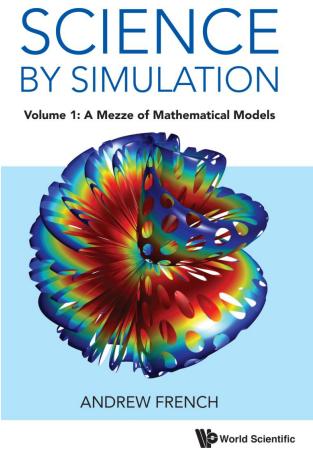
Volume 1: A Mezze of Mathematical Models



ANDREW FRENCH

World Scientific

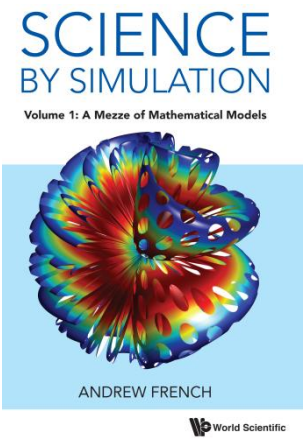
This is the first volume of **Science by Simulation**



As the title *A Mezze of Mathematical Models* suggests, it is a deliberate mixture of **contextualized** examples of **systems** that can be **modelled** using **mathematics**, and **simulated** using **computers**

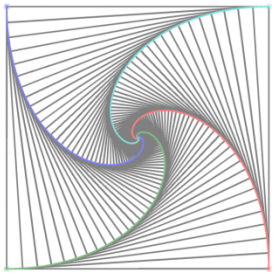
Who?

Dr Andy French. Physics teacher at Winchester College, UK.



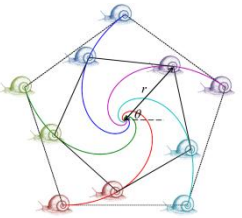
What?

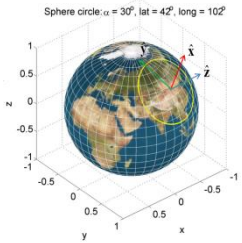
Book / website / educational concept

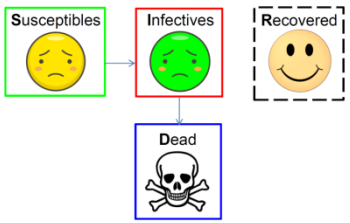


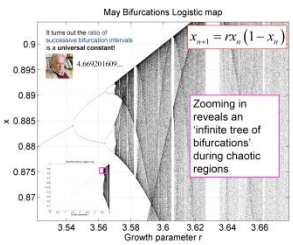
SCIENCE BY SIMULATION

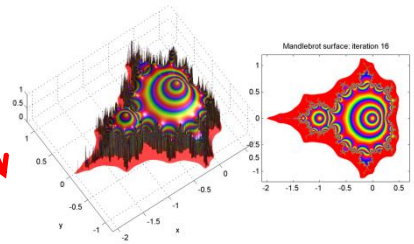
Dr Andrew French andy.french@physics.org www.eclecticon.info/scibysim.htm





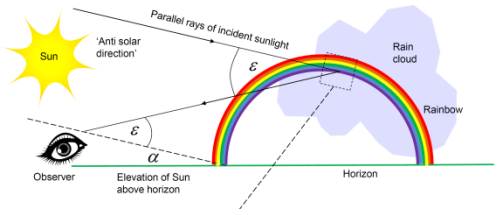


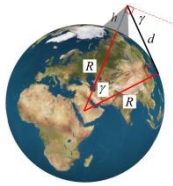




When?

Anticipated publication in 2022

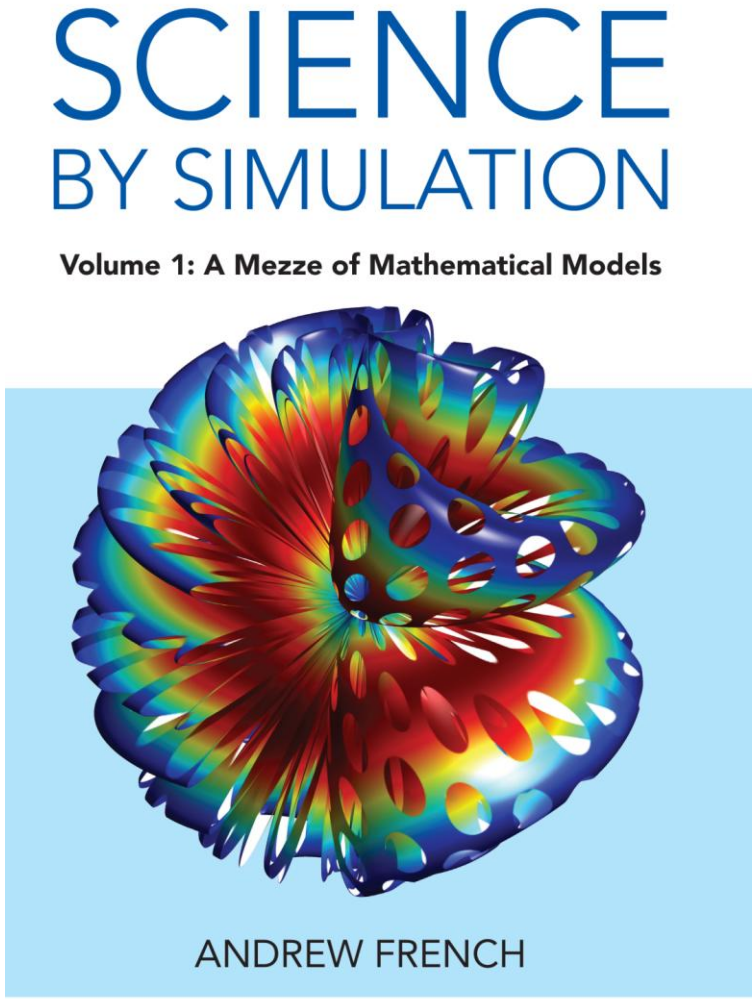




How?

A selection of example models and contexts

Learn to build mathematical models



The power of context

Science by storytelling!

Learn to code dynamic computer simulations

The Scientific Method

2 **Propose a theory**, involving things that can be measured

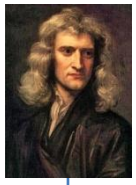
$$x = \frac{1}{2} g t^2$$

Distance fallen

Time

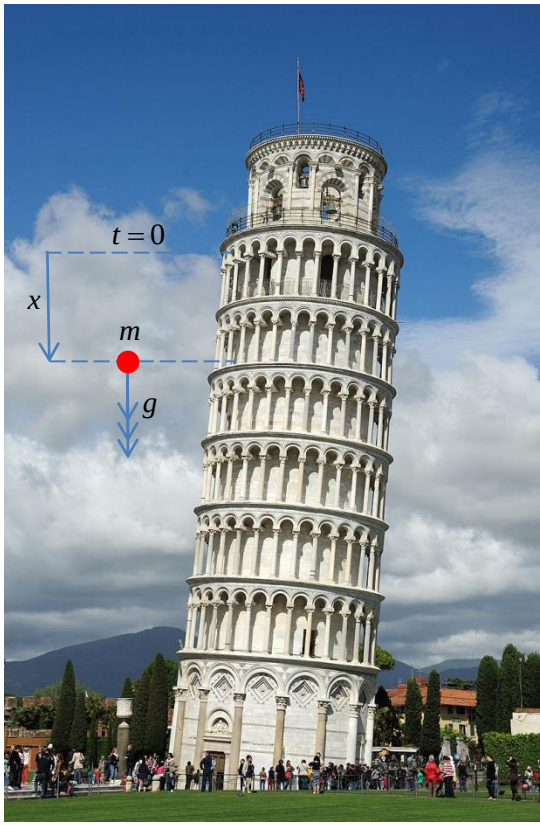
Acceleration (i.e. the rate at which speed increases)

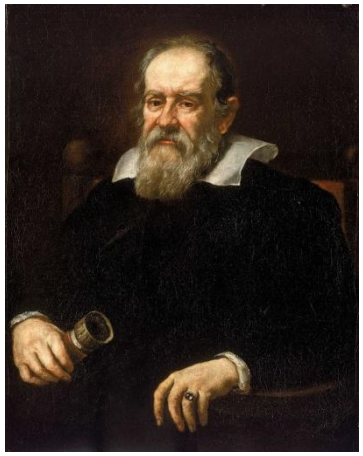
On Earth!



$g = 9.81 \text{ms}^{-2}$

3 **Do an experiment**
Is there a match between theory and measured results?
Is the experiment repeatable?





Galileo Galilei
1564-1642

1 **Make some observations**

"Falling objects seem to accelerate at the same rate... Independent of how massive they are!"

If we ignore air resistance!

4 **Write up your findings** and allow your peers to review it