Jean-Pierre Petit

Physics: the forgotten symmetry

way out of the labyrinth

der Kurven A, B, C die sechs Knoten und heften die Ränder kreuzweise aneinander. Damit ist die Fläche fertig, in den Kurven A, B, C durchdringt je ein Cylinder senkrecht ein ebenes Blatt. Der Anfangspunkt ist

Fig. 20 a.

Fig. 20 b.

ein dreifacher Punkt der Fläche. Die sich dort durchdringenden Mäntel haben die Koordinatenebenen zu Tangentialebenen. Wir sehen, unsere Fläche ist singularitätenfrei. Die Kurven A, B, C bilden in ihrer Ge-

For fifty years theoretical physics, cosmology and astrophysics have produced nothing tangible. Something happened around the seventies. Suddenly everything came to a standstill, whereas the previous seventy years had been a real golden age for these disciplines. During these years theory, experience and observation had combined to produce an explosion of discoveries. Suddenly, everything stops. Observations and experiments cease to agree with theoretical predictions. The models seem to have reached their limits.

The aim of this book is to briefly trace these failures and identify the causes. It will then be shown that there are salvific paths that the scientific community, clinging to simply delusional and sterile ideas, is reluctant to follow.

Chapter 1

The scientific revolution of the nineteenth century.

When new ideas, new concepts, new tools of thought appear, they strongly modify the vision of things at the moment when scientists bring them out, like blacksmiths from their forges. But they can still be very functional years later, even in our time.

We will cite two significant examples.

The emergence of certain disciplines in physics resembles childbirth. For many years the baby grows. The elements that make it up come together little by little. In 1757 the brilliant Swiss mathematician Leonhard Euler assembled various concepts, each of which describes a phenomenon of conservation of something.

Leonhard Euler
(1707-1783).

It expresses the conservation of mass through a first equation. Then the conservation of momentum in one second. Finally, energy in a third.

But what could already be called a model does not completely describe the behavior of fluids. There is something missing. These Euler fluids are too perfect. There is no turbidity. They do not exert any force on the objects that are immersed in them. They conserve their energy, but neither give nor take energy from their surroundings.

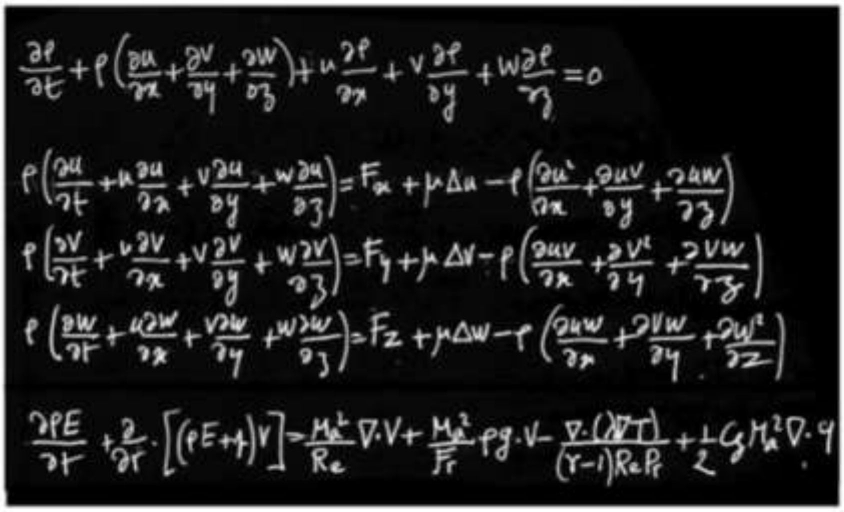
In 1822 the Frenchman Henri Navier introduced this missing concept, to which he gave the name of viscosity. Therefore, when a fluid runs along a wall, it transmits part of its momentum to it, and exerts a frictional force.

Claude Navier
1785-1836

But it is the Englishman George Stockes who gives to the child all its attributes, all its functions, in 1845. He adds to the Navier equations all the terms translating the mechanisms that give them their full functionality.

George Stokes
1819 - 1903

These equations, here they are.



The Navier-Stokes equations.

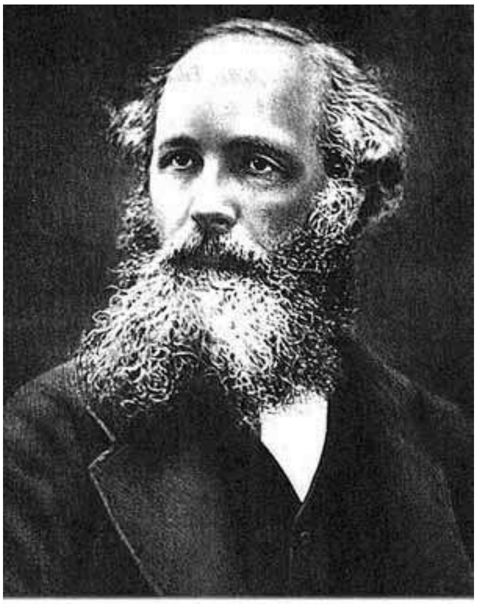
This is the final delivery. The range of phenomena that these equations can describe is immense.

What can we do with the Navier-Stockes equations? An example: we can create an aircraft like the SR-71, flying at Mach 3.2

The Blackbird

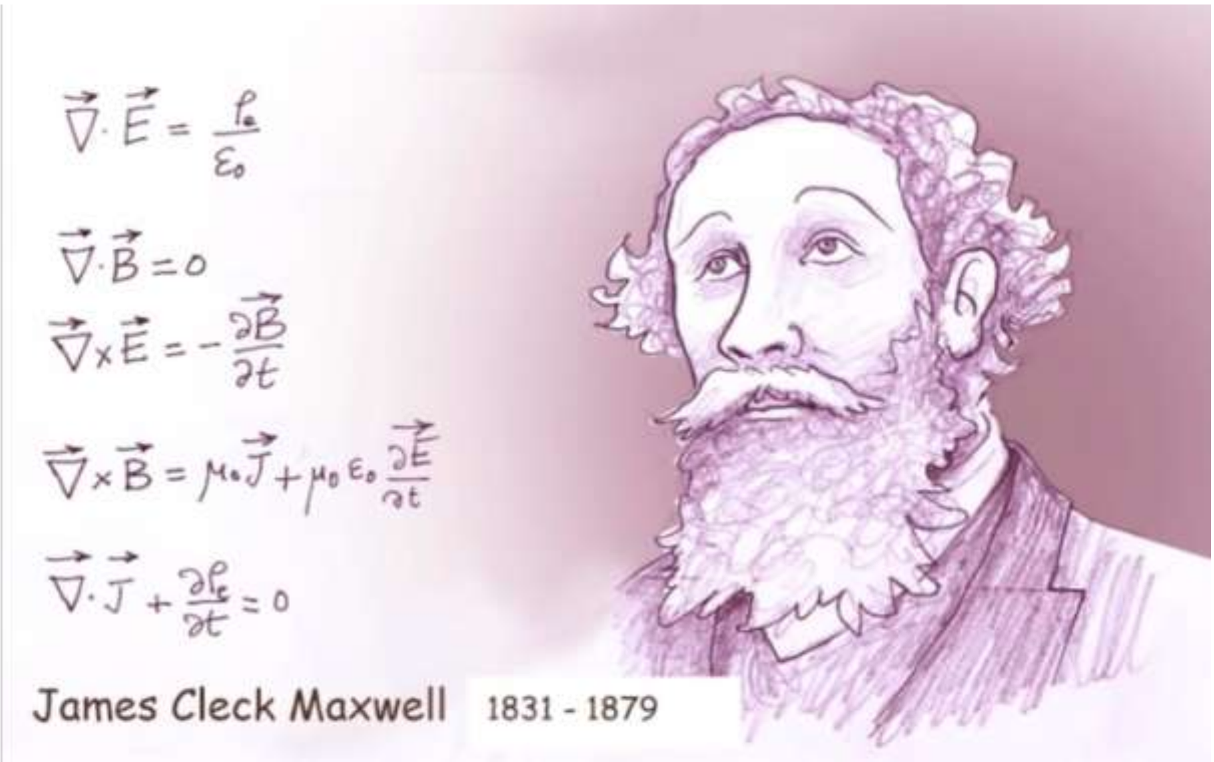
For 177 years the need to improve this mathematical modeling of fluid mechanics has never arisen.

We will give a second example of the birth of a model, wonderfully adapted to the reality it seeks to describe. In 1873 electromagnetism existed in the form of scattered pieces, laws to which the names of their authors had already been given. The Scotsman James Clerc Maxwell then managed to assemble them into a harmonious and functional whole.



James C. Maxwell
1831 - 1879

Just for curiosity, here are Maxwell's equations:



Maxwell's equations

You want to use a hair dryer, emit waves to a distant probe on its way to Mars? The Maxwell equations are at your service. When scientists want to design a radio telescope, the design is still based on this system of equations.

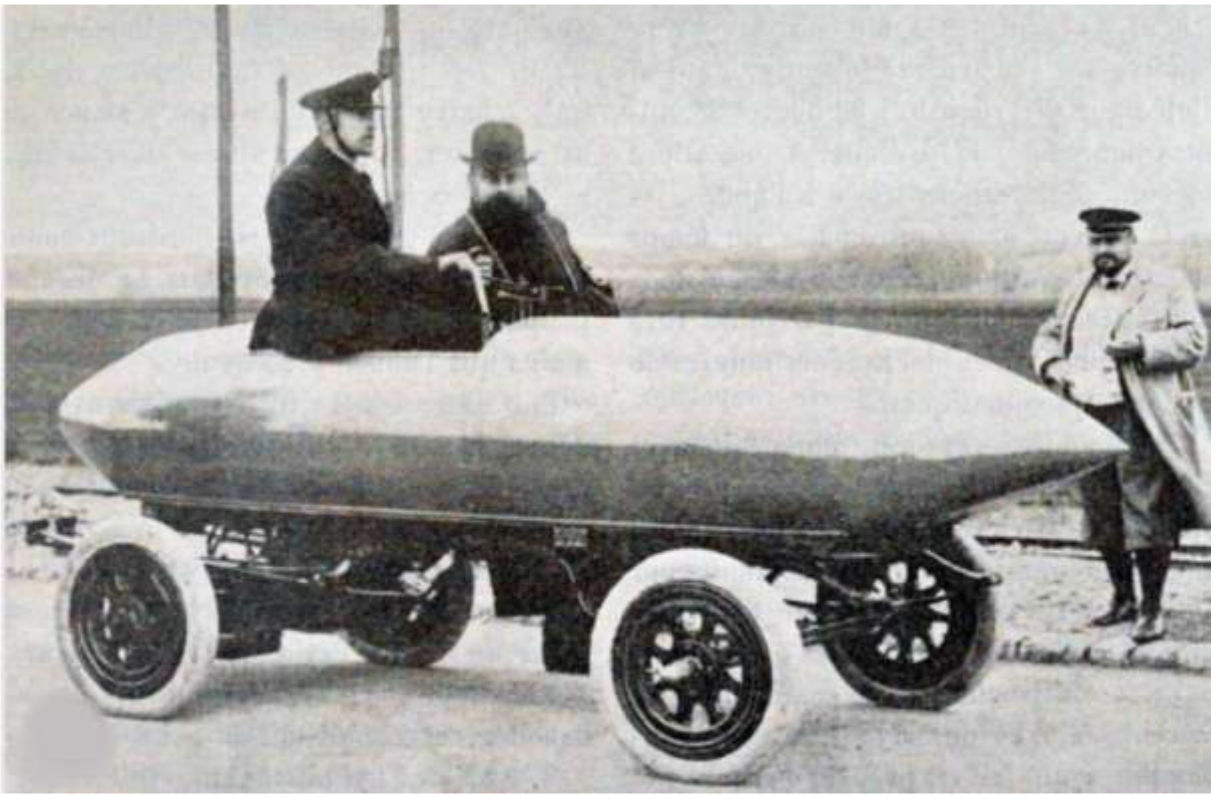
Radio telescope

It all works so well that for 150 years no one would think of improving this mathematical way of modelling the waltz of electrically charged particles.

It is recognised that some models stand the test of time. They don't seem to age, which makes them seem eternal. The same applies to the constants found in these beautiful, so-called universal equations. But are they really invariant? This is the question that will emerge later in this book.

At the time of Navier, Stockes and Maxwell we are in the middle of the nineteenth century. Let us put ourselves in the shoes of the scientists of that time. They feel dizzy in the face of such an explosion of knowledge.

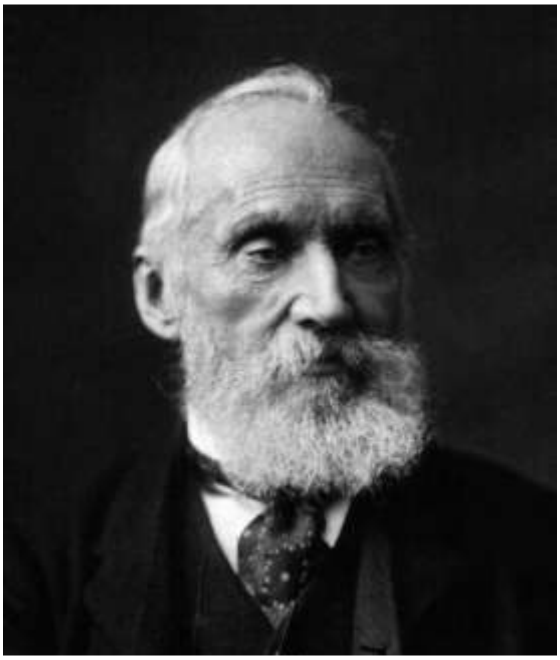
It must be said that their models generated what would later be called the industrial revolution. Horses are replaced by steam engines. Engineers create modern Towers of Babel, like the Eiffel Tower. The military, on the other hand, is designing large fish made of metal that fire torpedoes powered by electric motors. And on land, horses are being replaced by vehicles, also driven by electric forces, capable of driving their passengers at 100 km per hour. A speed that no one in the past would have imagined could ever be reached.



The Jamais contente, designed and built by the Belgian Camille Jénatzy. The only vehicle capable, in 1899, of reaching the dizzying speed of one hundred kilometres per hour.

Thus, in 1899, scientists thought they had reached the frontiers of knowledge. The models have achieved, they think, perfection. No progress is possible in the field of theory. It remains to make infinite use of these tools by creating objects, machines, vehicles, tools for measurement, observation and investigation.

William Thomson, of Irish origin, mastered all the science of his time. We owe him theorems allowing us to differentiate between what is realistic and what is not. He also invents engineers in many fields. As President of the Royal Society of London he does not hesitate to say that in the field of theory, all one can hope for is to add digits after the comma, in the numerical quantities one calculates.



William Thomson (Lord Kelvin) 1824 - 1907

When he described the panorama of scientific knowledge of his time he compared it to a blue sky with only a few small grey clouds remaining.

What did he mean by that?