



Ernst Mach

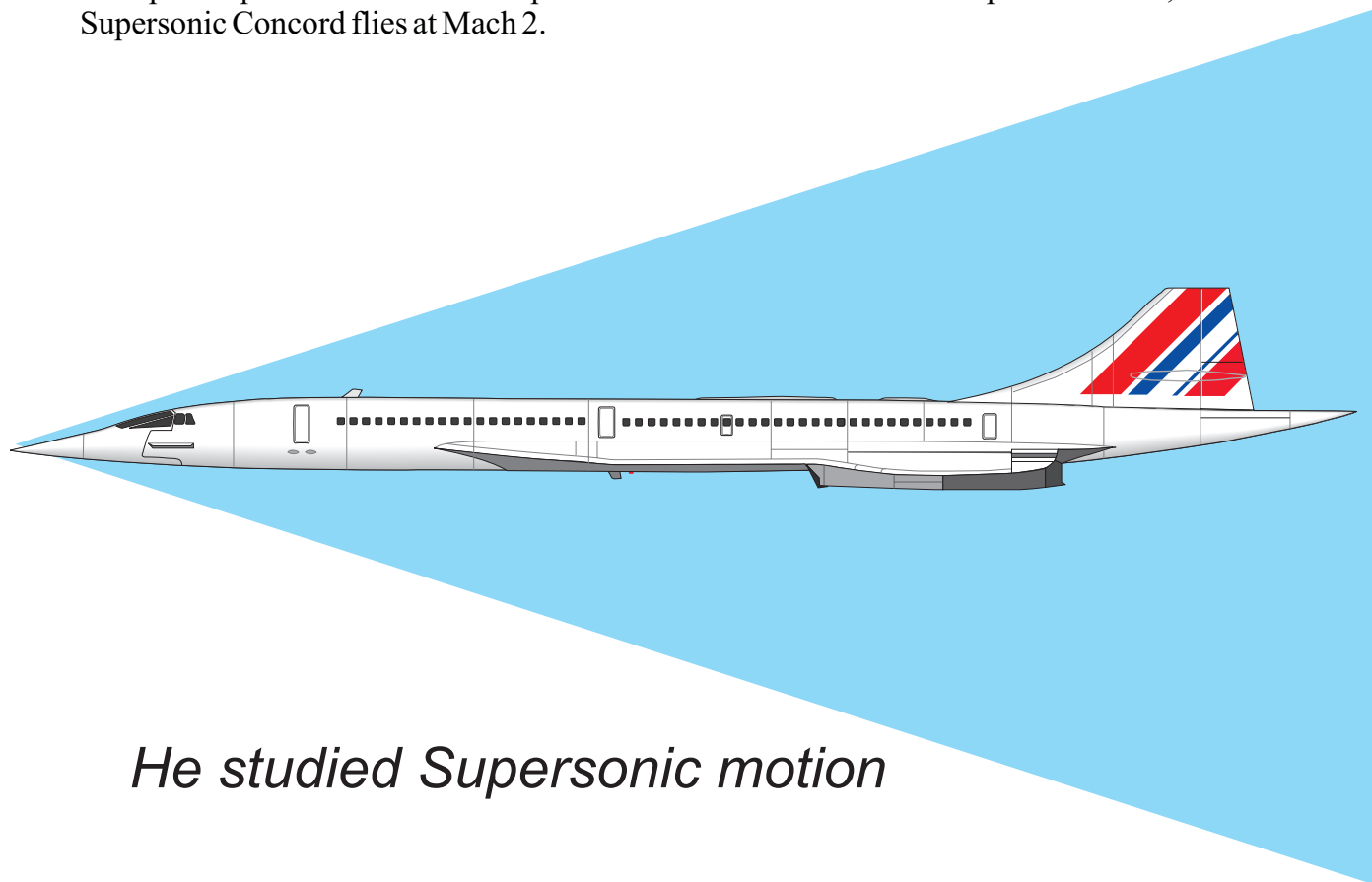
1838 - 1916

More than fifty years before the first supersonic flight Ernst Mach studied how shock waves are formed. He also studied hearing and sight. As a philosopher he was interested in the aims of science, the nature of theories and fact, and what experiments prove.

Ernst Mach was born in the small village of Chirlitz, near Brno, then Austria-Hungary but today in the Czech Republic. He was almost entirely educated at home by his parents until the age of 15 when he entered the local Gymnasium in Vienna. Mach's father was a well-educated person and his mother was raised within the tradition of a family engaged in law and medicine. She brought up her children with a love of music and poetry.

Mach studied at the University of Vienna and soon became a very skillful and well-recognized experimental physicist. He occupied himself with acoustics and optics, he gave an experimental proof of the Doppler effect and invented many important methods for investigating fast processes. He was able to visualize flying bullets and studied supersonic motions. Today we measure the speed of supersonic devices in a physical unit called after him the '*mach*'; it is the ratio of the speed of an object to the speed of sound in the undisturbed medium in which the object is travelling.

The speed equal to 'Mach 1' is the speed of sound. Mach 2 is twice the speed of sound, and so on. Supersonic Concorde flies at Mach 2.



He studied Supersonic motion



Inertial forces are due to masses in the whole Universe

Mach's main works in physics were devoted to mechanics and in fact Mach gave a thorough critical analysis of Newtonian theory. He took special interest in the origin of inertial forces, which appear in accelerating or rotating frames of reference. We know these forces such as centrifugal or Coriolis force from our experience, but it is not possible to attribute the source of these forces to some physical body. According to Mach's principle, inertial forces are due to the distribution of masses in the whole Universe. This interesting idea intrigued Einstein and even if he did not share Mach's view, he took inspiration for his own theories.

In 1864 Mach became professor of mathematics and physics in Graz and then moved to Prague. There he remained for 28 years researching and publishing many books and lectures. In 1867 Mach married Ludovica Marussig. His son, Ludwig, became a doctor of medicine, but he did not practise and he became his father's devoted assistant.

When Mach left Prague for Vienna in 1895, he switched more and more to philosophy. He suffered a stroke in 1897, which paralyzed his right side, fortunately without affecting his mental faculties. After retiring from the University in 1901 he was appointed to the upper chamber of the Austrian Parliament, a post he held for 12 years. He died in 1916.

Mach never accepted the modern ideas of quantum and atomic physics and theory of relativity. He remained a physicist of the nineteenth century, but his contribution to science is indisputable.