Professor Claude-Louis Navier (1785 – 1836)

See:
https://en.wikipedia.org/wiki/Claude-Louis_Navier
https://en.wikipedia.org/wiki/Navier%E2%80%93Stokes_equations
http://www-groups.dcs.st-and.ac.uk/history/Biographies/Navier.html
https://www.grc.nasa.gov/www/k-12/airplane/nseqs.html

Biography (from Wikipedia, the free encyclopedia):
After the death of his father in 1793, Navier's mother left his education in the hands of his uncle Émiland Gauthey, an engineer with the Corps of Bridges and Roads (Corps des Ponts et Chaussées). In 1802, Navier enrolled at the École polytechnique, and in 1804 continued his studies at the École Nationale des Ponts et Chaussées, from which he graduated in 1806. He eventually succeeded his uncle as Inspecteur general at the Corps des Ponts et Chaussées.He directed the construction of bridges at Choisy, Asnières and Argenteuil in the Department of the Seine, and built a footbridge to the Île de la Cité in Paris. In 1824, Navier was admitted into the French Academy of Science. In 1830, he took up a professorship at the École Nationale des Ponts et Chaussées, and in the following year succeeded exiled Augustin Louis Cauchy as professor of calculus and mechanics at the École polytechnique.
Navier formulated the general theory of elasticity in a mathematically usable form (1821), making it available to the field of construction with sufficient accuracy for the first time. In 1819 he succeeded in determining the zero line of mechanical stress, finally correcting Galileo Galilei's incorrect results, and in 1826 he established the elastic modulus as a property of materials independent of the second moment of area. Navier is therefore often considered to be the founder of modern structural analysis. His major contribution however remains the

Navier–Stokes equations (1822), central to fluid mechanics. His name is one of the 72 names inscribed on the Eiffel Tower.

Biography (from Karl-Eugen Kurrer, The History of the Theory of Structures from Arch Analysis to Computational Mechanics, Ernst & Sohn, 2008, 848 pages):

NAVIER, CLAUDE-LOUIS-MARIE-HENRI *10.2.1785 Dijon, France, †21.8.1836 Paris, France.

After losing his father – a lawyer in Dijon – at the age of just 14, the young Navier was cared for by his uncle and his wife, Emil and Marie Gauthey. Emil Gauthey taught part-time at was appointed general inspector of the Bridges & Highways Corps. Navier's uncle therefore became his role model. He studied at the École Polytechnique and École des Ponts et Chausées from 1802 to 1806 and afterwards, in addition to practical employment in bridge-building, dedicated himself to preparing a new edition of Gauthey's Traité des ponts (1813) and Bélidor's engineering manuals [Bélidor, 1813], [Bélidor, 1819]. In 1819 he was appointed professeur which resulted in his Leçons [Navier, 1820]. During the early 1820s, Navier established the principles of elastic theory together with Cauchy and Lamé. In May 1821 Navier submitted a paper to the Académie des Sciences in which he derived the basic equations of elastic theory (to be named after him and Lamé) from the discontinuum (molecular) hypothesis; an extract from this paper was published in 1823 [Navier, 1823/3], but publication of the complete work had to wait until 1827 [Navier, 1827]. The year 1828 was marked by a dispute between Navier and Denis Poisson (1781 –1840) in the journal Annales de Chimie et de Physique concerning the principles of elastic theory, which, however, did not supply any clarification because both based their ideas on the molecular hypothesis. Navier was commissioned by the government to travel to England and Scotland in order to find out about the construction of chain suspension bridges; his findings were published in his famous Rapport, which contained the first theory of suspension bridges [Navier, 1823/1]. Although this publication earned him membership of the Académie in 1824, its implementation in practice resulted in numerous difficulties for Navier in connection with his failed Pont des Invalides suspension bridge project [Stüssi, 1940, p. 204]. At the same time, the 1820s can be seen as his most creative years. His Résumé des Leçons [Navier, 1826] made Navier the founder of theory of structures; this work was to challenge great minds in the establishment phase of structural theory – like Saint-Venant, who obtained a copy of the third edition and improved on it by adding a grandiose historico-critical commentary [Navier, 1864]. In Germany, Moritz Rühlmann in particular is credited with establishing Navier's theory of structures [Navier, 1851/1878]. Navier became Cauchy's successor at the chair of analysis and mechanics at the École Polytechnique, Chevalier de la Légion d'Honneur and section inspector of the Bridges & Highways Corps – all in 1831. In sociological terms, Navier – like Clapeyron and other prominent scientists and engineers – was committed to the ideas of Saint-Simon and his followers. Therefore, Navier nominated Auguste Comte as his assistant at the École Polytechnique and played an active part in events in Raucourt de Charleville's Institut de la Morale Universelle [McKeon, 1981, p. 2]. In this way the classical engineering sciences established in France at that time – in the first place theory of structures and applied mechanics – experienced an implicit sociological significance on which the, as it were, natural positivism of the engineering scientist dedicated to the "scientific paradigms" [Ropohl, 1999, pp. 20 – 23] could draw sustenance.

Main contributions to structural analysis:

Leçons données à l'École Royale des Ponts et Chaussées sur l'Application de la Mécanique [1820]; Rapport et Mémoire sur les Ponts suspendus [1823/1]; Extrait des recherches sur la flexion des planes élastiques [1823/2]; Sur les lois de l'équilibre et du mouvement des corps solides élastiques [1823/3]; Résumé des Leçons données à l'École Royale des Ponts et Chaussées sur l'Application de la Mécanique à l'Etablissement des Constructions et des Machines. 1er partie: Leçons sur la résistance des materiaux et sur l'établissement des constructions en terre, en maçonnerie et en charpente [1826]; Mémoire sur les lois de l'équilibre et du mouvement des corps solides élastiques [1827]; Résumé des Leçons données à l'École des Ponts et Chaussées sur l'Application de la

Mécanique à l'Etablissement des Constructions et des Machines. 2. Aufl., Vol. 1: Leçons sur la résistance des materiaux et sur l'établissement des constructions en terre, en maçonnerie et en charpente, revues et corrigées. Vol. 2: Leçons sur le mouvement et la résistance des fluides, la conduite et la distribution des eaux. Vol. 3: Leçons sur l'établissement des machines [1833/1836]; Mechanik der Baukunst (Ingenieur-Mechanik) oder Anwendung der Mechanik auf das Gleichgewicht von Bau-Constructionen [1833/1878]; Résumé des leçons données à l'École des Ponts et Chaussées sur l'application de la mécanique à l'établissement des constructions et des machines, avec des Notes et des Appendices par M. Barré de Saint-Venant [1864]