Coulomb, the artisan of modern geotechnical engineering

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The presentation makes a perspective of the influence of Charles-Augustin de Coulomb's theory on the research and the practice of modern geotechnical engineering. In his Essay (1773), Coulomb presented clear propositions on friction and cohesion on a sliding plane, giving birth to today's soil mechanics. Coulomb's theory started with the suggestion that the strength on a slip plane must involve a combination of friction and cohesion. Coulomb used calculus to obtain active earth pressure and show how friction and cohesion together affect lateral earth pressure. Coulomb was also a gifted experimental scientist and wrote, when discussing friction, cohesion and interlocking that "only experiment can help us to decide the reality of the different causes" [for resistance]. With the fundamental equation [$\pm t = c + \mu \sigma' = c + \tan \phi \sigma'$], Coulomb brought his theory to design. Design guidelines and standards are written in terms of cohesion and friction and Coulomb's fundamental slip plane model still dominates today's soil mechanics. Coulomb's insight led to further developments by Hvorslev, Skempton, Caquot and Kérisel, and the ensuing work at Cambridge University in the UK and at Harvard (Terzaghi and Casagrande) and MIT (Lambe and Ladd) in the USA. Coulomb's work, originally for masonry (a very stiff soil) enables the geotechnical professor to map soil behaviour, and continues to inspire new generations of researchers to look into improved and novel interpretations of the shear strength of soil and rock.