



### **Professor Walther Ritz (1878 – 1909)**

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Walther Ritz (b. February 22, 1878 in Sion, Switzerland - d. 7 July 1909 in Göttingen) was a Swiss theoretical physicist.

His father, Raphael Ritz, a native of Valais, was a well-known landscape and interior scenes artist. His mother was the daughter of the engineer Noerdlinger of Tübingen. Ritz studied in Zurich and Göttingen. He is most famous for his work with Johannes Rydberg on the Rydberg–Ritz combination principle. Ritz is also known for the variational method named after him, the **Ritz method**. Ritz died in 1909, at the age of 31. According to Forman's Dictionary of Scientific Biography, Ritz contracted tuberculosis in 1900, which led to his death in 1909. According to Ritz's collected works (*Euvres*) the disease was pleurisy.

## Criticism of Maxwell-Lorentz electromagnetic theory

Not so well known is the fact that in 1908 Walter Ritz produced a lengthy criticism of Maxwell-Lorentz electromagnetic theory, in which he contended that the theory's connection with the luminescent ether (see Lorentz ether theory) made it "essentially inappropriate to express the comprehensive laws for the propagation of electrodynamic actions."

Walter Ritz pointed out seven problems with Maxwell-Lorentz electromagnetic field equations:

- 1 Electric and magnetic forces really express relations about space and time and should be replaced with non-instantaneous elementary actions (his emission theory).
- 2 Advanced potentials don't exist (and their erroneous use led to the Rayleigh-Jeans ultraviolet catastrophe).
- 3 Localization of energy in the ether is vague.
- 4 It is impossible to reduce gravity to the same notions.
- 5 The unacceptable inequality of action and reaction is brought about by the concept of absolute motion with respect to the ether.
- 6 Apparent relativistic mass increase is amenable to a different interpretation.
- 7 The use of absolute coordinates, if independent of all motions of matter, requires throwing away the time honored use of Galilean relativity and our notions of rigid ponderable bodies.

The following text is from: [http://en.citizendium.org/wiki/Rayleigh-Ritz\\_method](http://en.citizendium.org/wiki/Rayleigh-Ritz_method)

## Rayleigh-Ritz method

The Rayleigh-Ritz method is used for the computation of approximate solutions of operator eigenvalue equations and partial differential equations. The method is based on a linear expansion of the solution and determines the expansion coefficients by a variational procedure, which is why the method is also known as linear variation method.

The method is named for the Swiss mathematical physicist Walter Ritz and the English physicist Lord Rayleigh (John William Strutt). Among numerical mathematicians it is common to append the name of the Russian mathematician Boris Galerkin and to refer to it as the Rayleigh-Ritz-Galerkin method.

## History

In the older quantum mechanics literature the method is known as the Ritz method, called after the mathematical physicist Walter Ritz,[1] who first devised it. In prewar quantum mechanics texts it was customary to follow the highly influential book by Courant and Hilbert,[2] who were contemporaries of Ritz and write of the Ritz procedure (Ritzches Verfahren).

In the numerical analysis and mechanical engineering literature one usually prefixes the name of Lord Rayleigh to the method, and lately this has become common in quantum mechanics, too. Leissa [3], knowing the method from applications in mechanical engineering, recently became intrigued by the name and after reading the original sources, he discovered that the methods of the two workers differ considerably, although Rayleigh himself believed [4] that the methods were very similar and that his own method predated the one of Ritz by several decades. However, according to Leissa's convincing conclusion, Rayleigh was mistaken and the method

now known as Rayleigh-Ritz method is solely due to Ritz. Leissa states: “Therefore, the present writer concludes that Rayleigh’s name should not be attached to the Ritz method; that is, the Rayleigh–Ritz method is an improper designation.”

## References

- [1] W. Ritz, Über eine neue Methode zur Lösung gewisser Variationsprobleme der mathematischen Physik, [On a new method for the solution of certain variational problems of mathematical physics], Journal für reine und angewandte Mathematik vol. 135 pp. 1 - 61 (1909).
- [2] R. Courant and D. Hilbert, Methoden der mathematischen Physik, (two volumes), Springer Verlag, Berlin (1968)
- [3] A.W. Leissa, The historical bases of the Rayleigh and Ritz methods, Journal of Sound and Vibration 287, pp. 961 - 978 (2005)
- [4] Lord Rayleigh, On the calculation of Chladni’s figures for a square plate, Philosophical Magazine Sixth Series 22 225 - 229 (1911)