

# Lorenz or Lorentz?

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This short (and modest) note has generated a number of reactions! The first one is the publication, in the present issue, of an interesting note by Dr. Sihvola. It concerns the paternity of another Lorenz-Lorentz common effort. The second reaction is a message by Professor J. Bach Andersen, Vice-President of URSI, who lets me know that an interesting review of Ludvig Valentin Lorenz' career and scientific work, written by M. Pihl, can be found in Volume 1 of *Electromagnetic Theory and Antennas*.

This book, published by Pergamon Press in 1963, contains the proceedings of the 1962 Symposium on Electromagnetic Theory, the well-known series organized by URSI's Commission B. Pihl's article, some 10 pages long, mentions that Lorenz was, indeed, the first physicist to introduce retarded potentials...

I would like to make use of the present addendum to mention that "Kirchhoff" was misprinted in my original note.

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## Lorenz-Lorentz or Lorentz-Lorenz?

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Inspired by the legitimate note by Professor Van Bladel [1], about the paternity of retarded potentials in electromagnetics, and, by the way, also the Lorenz gauge, I take the liberty to continue the discussion, and to further restore some of Lorenz's honor (and divest that from Lorentz, but on the other hand, he really cannot be claimed to be short of fame; and also, let it be clear that my admiration for him is not diminished).

My focus is on the connection between the polarizability,  $\alpha$ , of a dielectric sphere, and the optical refractive index,  $n$ , of the material consisting of a collection of this type of spheres. This connection,

$$\frac{n^2 - 1}{n^2 + 2} = \text{proportional to } \alpha,$$

has been known as the Lorentz-Lorenz formula. This label on the formula is due to the articles, both published in the year 1880, by Hendrik Antoon Lorentz [2] and Ludvig Valentin Lorenz [3]. These appeared in different issues of this respected journal, and because of this temporal order, the names also appear in the present sequence in the name of the formula. At least, this is the reason given in the famous book by Born and Wolf [4], and *Classical Electrodynamics* by Jackson [5] can be mentioned as another authoritative example that follows the same path.

However, the above-mentioned communication by Ludvig Lorenz was not his first one to present studies on the refractive power of molecules. As Lorenz mentions in the opening sentences in his article, his intention was to present, in the German language (to a broader scientific community), his research results which he had earlier published in Danish. His result (the expression above) can really be found in the 1869 paper *Experimentale og theoretiske Undersøgelser* [6]. This was one year before H. A. Lorentz matriculated at the University of Leiden, and therefore it seems clear that the "Lorentz-Lorenz formula" should be rechristened the "Lorenz-Lorentz formula."

It is worth noting that, in recent years, Ludvig Lorenz has received some attention. In March, 1990, a conference on optical particle sizing was organized in the Mechanical and Aerospace Engineering Department at Arizona State University, where one session was dedicated to Lorenz. The proceedings of the symposium contain six historical articles on light scattering.

As a final remark, following the example of Professor Van Bladel, I confess my lack of adequate historical consciousness in reproducing this incorrect label for the Lorenz-Lorentz expression in reports of my own studies. In retrospect, the correct order of names could, indeed, have been found in Sommerfeld's book [7].

### References

1. "Lorenz or Lorentz," *IEEE Antennas and Propagation Magazine*, 33, No. 2, April 1991, p. 69.
2. "Über die Beziehung zwischen der Fortpflanzungsgeschwindigkeit des Lichtes und der Körperdichte," *Annalen der Physik und Chemie*, Band 9, Heft 4, pp. 641-665, 1880.
3. "Über die Refraktionsconstante," *Annalen der Physik und Chemie*, Band 11, Heft 9, pp. 70-103, 1880.
4. *Principles of Optics* (Sixth Edition), New York, Pergamon, p. 87, 1980.
5. *Classical Electrodynamics* (Second Edition), New York, Wiley, p. 155, 1975.
6. *Experimentale og theoretiske Undersøgelser, Det kongelige danske Videnskabernes Selskabs Skrifter*, Raekke 5, Bind 8, p. 203-248, 1869.
7. *Electromagnetics*, New York, Academic Press, p. 75, 1952.