

## Lord Kelvin's Vortex Sponge Theory of the Aether

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29th October 2025*

**Abstract: A fictional scene at the Royal Society, Burlington House, Piccadilly, London, on a December evening in 1892.**

*Setting:* The grand hall of the Royal Society, gasoliers casting a warm glow, with a few experimental electric lamps above the dais flickering faintly. Heavy oak paneling and tall windows look onto Piccadilly. A brass-bound Hertzian oscillator and a small Michelson interferometer gleam under the lights.

Seated at the dais are **LORD KELVIN, SIR OLIVER LODGE, OLIVER HEAVISIDE, SIR GEORGE STOKES,** and **COLONEL SHADRACK SHERBURN**, the American Ambassador — a distinguished, elderly gentleman who had faced down a lynch mob in Arkansas in the antebellum South, later recalled to duty on the Confederate side during the Civil War, and now appointed to the Court of St. James by Washington as a gesture of postwar reconciliation. The audience of scholars waits in respectful silence.

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### **SIR OLIVER LODGE**

(tapping the table lightly)

Gentlemen, if we may begin. Tonight we consider the scientific wonders of 1887 — Michelson and Morley's search for the aether, and Heinrich Hertz's demonstration of the radiative properties of electricity.

*(The audience begins to applaud softly. The gas and electric lights flicker together over the dais.)*

### **LORD KELVIN**

Indeed, Michelson and Morley? Sir George, you have long reflected on their result.

### **SIR GEORGE**

(steady, deliberate)

Their experiment confirms what I have long held: the aether is drawn along with

the Earth's motion. No relative motion was detected because the laboratory and the medium move together. In that sense, the Michelson-Morley result vindicates the aether-drag hypothesis.

**HEAVISIDE**

(not wanting to get drawn in to the entrainment debate)

Quite so. And later that same year, Hertz gave visible form to Maxwell's invisible waves — a triumph of experiment over speculation.

**LORD KELVIN**

Or, as I sometimes say, a current escapes and keeps on going, much to our curiosity.

**COLONEL SHERBURN**

(respectfully, speaking in his southern drawl)

Gentlemen, I would only add that Maxwell made that rather obvious — once he linked Weber's constant to the dielectric constant. That alone tied the speed of his waves to the speed of an electric current in a wire. Hertz merely let us see it, [1].

*(Heaviside and Lodge nod approvingly; the room is quiet.)*

**SIR OLIVER LODGE**

Well said, Colonel. Maxwell set the stage; Hertz performed the first act.

**HEAVISIDE**

(with a keen, probing look)

Let us now consider the derivation of the wave equation for laminar motion in a finely structured turbulent fluid, as our colleague Lord Kelvin formulated it that same year, [2]. He connected the wave speed directly to the local motion of the fluid. My Lord, how do you interpret this relationship?

**LORD KELVIN**

(stroking his beard thoughtfully)

At first, I conceived of the wave-carrying medium as a sort of vortex sponge, composed of countless vortex rings. Yet I was soon compelled to reconsider this notion, and instead I turned my attention to irrotational revolutions, each with a vacuous core, [3], [4].

**COLONEL SHERBURN**

(leaning slightly forward, a faint smile playing at his lips)

Pardon me, my Lord, but I confess I struggle to picture an irrotational revolution. It seems to me a revolution without turning — rather like a horse that gallops in place and calls it a race.

### **HEAVISIDE**

(turning toward the Ambassador, addressing him politely, eager to defend Lord Kelvin)

With all due respect, Mr. Ambassador, I believe my Lord Kelvin's meaning is somewhat different from what it might at first appear. I think he is perhaps considering a kind of fine-grained rotational elasticity, rather than ordinary shear elasticity, and that by 'irrotational' he refers precisely to the absence of toroidal filaments aligned along the vortex cores — not a contradiction, but a subtle distinction in the motion of the medium, [5].

### **LORD KELVIN**

(nodding slightly, appreciative of Heaviside's support)

Exactly so. The motion is not absent, only organized differently. The fluid's strain still propagates; it is the manner of rotation that differs.

### **SIR OLIVER LODGE**

(with a thoughtful expression)

If I may, gentlemen — let us put aside the vortex rings as the completed magnetic field lines, as Maxwell first constructed them in 1861. For the purpose of understanding the propagation of electromagnetic waves, we need concern ourselves only with the actual vortices themselves, the motions of the medium at the finer scale. It is the behaviour of these elemental vortices, not the finished structures they compose, that determines the transmission of light.

### **LORD KELVIN**

(nodding, approvingly)

Precisely. The rings serve to visualize the total magnetic field, but the wave's motion depends on the local strains of the vortices themselves.

### **HEAVISIDE**

(smiling, leaning back slightly)

A subtle but crucial distinction. One must never mistake the building blocks for the complete edifice.

### **SIR OLIVER LODGE**

(eyes fixed on Lord Kelvin)

My Lord, if I may venture — do you see any possibility that your vision of vortices with vacuous cores, [3], might, in some way, relate to the newly discovered electrons, [4]? Could these tiny, discrete entities be connected to the cores of your vortices, or is that yet too speculative?

### **LORD KELVIN**

(pausing, stroking his beard, eyes distant in thought)

A tantalizing suggestion, Sir Oliver. The electron is indeed a new and mysterious

actor upon the stage. Whether it occupies the vacuous core itself, or whether it represents some perturbation of the surrounding medium, I cannot yet say with certainty. But it is precisely such questions that make the study of the medium so compelling, [4].

**HEAVISIDE**

(nodding eagerly)

It would certainly fit with the notion of fine-grained structures transmitting electromagnetic effects — each electron perhaps riding upon or perturbing the vortical motion.

**SIR GEORGE**

Then perhaps, gentlemen, the discreteness of the electron and the continuity of the fluid extending outwards from it are not opposing ideas, but complementary aspects of one scheme — as the Earth itself, though a bounded sphere, may carry with it a portion of the luminiferous aether in its course. In that likeness, I think, lies the reconciliation of Michelson and Morley’s experiment with theory.

**COLONEL SHERBURN**

(lighting a pipe, then leaning back and forward again, his American drawl quiet but deliberate)

If I might add a word, gentlemen — it strikes me that these electrons might well be sinks in your aethereal electric fluid, and that somewhere there must be a counterpart, a source, to balance the account. Each vortex might then be an electron in mutual orbit with its opposite — a perfect pair, one drawing in, the other giving out.

*(The others turn toward him; a murmur passes through the room.)*

**HEAVISIDE**

(eyes brightening, speaking crisply)

A symmetrical conception indeed! A circulation between source and sink — that would furnish a natural engine for the propagation of electric disturbance through space, all in keeping with time-varying electromagnetic induction.

**COLONEL SHERBURN**

*(thoughtful, tapping his pipe)*

One might suppose, gentlemen, that the fluid flows into an electron not merely by local tension, but because some deeper, unseen agency — the same that pulls the Earth toward the Sun — acts upon the aether itself. The same force governs the currents in the smallest of sinks and the motions of the largest of bodies.

## References

- [1] Tombe, F.D., “*German Scientist Sends Electric Signals Without Wires*”, (2025)  
[https://www.researchgate.net/publication/395031533\\_German\\_Scientist\\_Sends\\_Electric\\_Signals\\_Without\\_Wires\\_As\\_Reported\\_West\\_of\\_the\\_Mississippi\\_River\\_in\\_1888](https://www.researchgate.net/publication/395031533_German_Scientist_Sends_Electric_Signals_Without_Wires_As_Reported_West_of_the_Mississippi_River_in_1888)
- [2] Thomson, Sir W., “*On the Propagation of Laminar Motion through a turbulently moving Inviscid Liquid*”, Phil. Mag. vol. xxiv, p.342, (1887)  
<https://archive.org/details/s5philosophicalm24lond/page/342/mode/2up>
- [3] Thomson, Sir W., “*A History of the Theories of Aether and Electricity*”, (1910)  
E.T Whittaker, p.336. Proc. Roy. Irish Acad., November 30, 1889; Kelvin’s *Math. and Phys. Papers*, iv, p.202.
- [4] Thomson, Sir W., “*Aepinus Atomized*”, from the Jubilee Volume presented to Prof. Boscha in November, 1901. *Baltimore Lectures*, 1904, Appendix E, pp.541-568.  
The idea of revolutions around vacuous cores could have been Lord Kelvin’s inspiration for the *electrions* in this article.  
[https://zapatopi.net/kelvin/papers/aepinus\\_atomized.html](https://zapatopi.net/kelvin/papers/aepinus_atomized.html)
- [5] Heaviside, O., “*Electromagnetic Theory-Elements of Vectorial Algebra and Analysis*”, vol. i, ‘*The Rotational Ether, Compressible or Incompressible.*’, Section 153A, p. 243, (1892)  
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This article benefited from ChatGPT assistance in its articulation.