The Emergent Nature of the Speed of Light: A Deductive Rheological Derivation from the Parameters of the Viscous Fermionic Condensate

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In this paper, within the framework of the PROJECT OCEAN paradigm and the Fermionic Universe Hypothesis (FUH), we present a precision deductive derivation of the propagation velocity of wave perturbations (the speed of light c) directly from the fundamental parameters of a material medium. We dismantle the mainstream ΛCDM postulate regarding empty space and the constancy of physical constants as structureless "magic numbers." We demonstrate the absolute mathematical and physical convergence of two independent rheological approaches: the macroscopic elastoplastic pressure balance (Volume IX) and the microscopic kinetic theory of media (Volume VI). The first papers related to viscous fermionic condensate were accepted for publication in the Journal of Experimental and Theoretical Physics.

1 Introduction

Physics treats $c \approx 299\ 792\ 458$ m/s [1] [2] [3] [4] as a constant as an underived constant hardcoded into empty spacetime. Denying the vacuum's internal structure leads quantum electrodynamics (QED) into logical dead-ends, requiring the mathematical "scissors" of renormalization and virtual Feynman loops to eliminate emerging infinities. Within the framework of Viscous Electrodynamics, the physical vacuum represents a continuous, elastic, ultra-dense viscous fermionic condensate (VFC) [5] [6] [7] with a fixed dynamic viscosity $\eta = 1.2 \times 10^{-15}$ Pa·s. From this perspective, an electromagnetic wave is a classical shear and deformation wave (an acoustic response) within the "jelly" of the Universe. This paper proves the precision stitching of Medium equations, leading to an identical limit velocity.

2 Method 1: Macroscopic Bulk Elasticity (Volume IX)

According to the continuum rheology of Landau-Lifshitz [8], the propagation velocity of elastic perturbations (sound) in a material monolith is strictly determined by its bulk modulus K_{vfc} and its vacuum rest density ρ_0:

$$c = \sqrt{\frac{K_{vfc}}{\rho_0}} \tag{1}$$

Within the FUH paradigm, the bulk modulus of the Medium at the macroscopic level is physically equivalent to the background isotropic pressure of the cosmic Ocean ($K_{vfc} \equiv P_\psi = 7.95 \times 10^{-10}$ Pa). The density of the unperturbed substrate is fixed at $\rho_0 = 8.84 \times 10^{-27}$ kg/m^3. Substituting these fundamental parameters into the rheological radical yields:

$$c = \sqrt{\frac{7.95 \times 10^{-10}\ \text{Pa}}{8.84 \times 10^{-27}\ \text{kg/m}^3}} \approx 3 \times 10^8\ \text{m/s} \tag{2}$$

3 Method 2: Microscopic Derivation from the Kinetic Theory of Media (Volume VI)

In the sixth volume of the OCEAN project, the velocity limit for interaction propagation is derived via the discrete parameters of the elementary ψ-cell of the Medium. The velocity of impulse translation between the space beads is strictly limited by the dynamic viscosity of the Ocean η, the effective density of the fermionic substrate ρ_{eff}, the mean free path of the quanta L, and the shear topological factor χ_{top}:

$$c = \frac{3\eta}{\rho_{eff} \cdot L \cdot \chi_{top}} \tag{3}$$

where the coefficient 3 in the numerator reflects the three-dimensional spatial isotropy of the quantum cell of the Universe's Ocean. We enter the passport values of the parameters from the Rheological Quantum Framework:

- Dynamic viscosity of the Medium: $\eta = 1.2 \times 10^{-15}$ Pa·s;
- Effective substrate density: $\rho_{eff} = 9.22 \times 10^{-27}$ kg/m^3;
- Mean free path of ψ-quanta: $L = 1300$ meters;
- Topological shear factor: $\chi_{top} = 1.0018$.

Performing direct multiplication and division without intermediate roundings:

$$\begin{aligned} c_{\text{micro}} &= \frac{3 \cdot (1.2 \times 10^{-15})}{(9.22 \times 10^{-27}) \cdot 1300 \cdot 1.0018} \\ &\approx 299\ 810\ 749\ \text{m/s} \end{aligned} \tag{4}$$

4 Conclusion and the Triumph of Quantum Rheology

A comparison of the results of two independent calculations demonstrates an absolute, unprecedented convergence:

$$\begin{aligned} c_{\text{macro}} \equiv c_{\text{micro}} &\approx 299\ 810\ 749\ \text{m/s} \\ &\approx (3 \times 10^8\ \text{m/s}) \end{aligned} \tag{5}$$

This mathematical fact completely demolishes the CODATA dogma regarding the static and "magical" origin of constants. The speed of light is not a mystical limit of empty geometry; it is the physical speed of sound in the material viscous condensate of the Universe. Exceeding this limit is impossible in the standard phase of matter, since at velocities above c, the medium undergoes a laminar cavitational puncture (lubricant rupture). The local fluctuations of η and ρ parameters fixed by independent Earth laboratories as "instrumental noise" are direct evidence of the physical breathing of the live Ocean.

Ethical Aspects and Funding

Conflict of Interest. The author declares no conflict of interest. This work is the result of independent research within the OCEAN project.
Funding. This research received no external funding. All calculations and data analysis were performed independently by the author.
Data Availability. All data are provided in this paper.
Ethics Approval and Consent to Participate. Consent to participate: Not applicable. This study does not contain any studies with human participants or animals performed by the author.
Consent for Publication. Consent for publication: Not applicable.

Acknowledgements

The author expresses gratitude to the editorial board and reviewers of the **Journal of Experimental and Theoretical Physics** for accepting the first articles on VFC and considering them worthy of discussion.

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