Scalar Constraint Equation in Biquaternionic Field

Starting from the decomposition of the field:

$$\Theta(q) = \rho(q)e^{i\phi(q)}$$

We derived the constraint:

$$\eta^{\mu\nu}\partial_\mu\rho\,\partial_\nu\phi = 0$$

This implies orthogonality between gradients of amplitude and phase in Minkowski space.

Example: Spherical Symmetry

Let:

$$\rho = \rho(r), \quad \phi = \phi(t)$$

Then:

$$\partial_\mu\rho\,\partial^\mu\phi = \left(\frac{d\rho}{dr}\right)^2 \cdot 0 + 0 \cdot \left(\frac{d\phi}{dt}\right)^2 = 0$$

So the constraint is trivially satisfied.

Author's Note

This work was developed solely by Ing. David Jaroš. Large language models (ChatGPT-4o by OpenAI and Gemini 2.5 Pro by Google) were used strictly as assistive tools for calculations, LaTeX formatting, and critical review. All core ideas, equations, theoretical constructs and conclusions are the intellectual work of the author.