The Informational Field and Superluminal Communication: A Bridge Between Physics and Consciousness

Abstract

Recent theoretical advances in electromagnetic field theory suggest the existence of an "informational field" capable of transmitting signals instantaneously—without the transfer of energy or momentum. This concept, developed by physicist V.P. Oleinik, builds upon established principles of electrodynamics, quantum theory, and the Aharonov-Bohm effect to propose a novel mechanism for non-local communication. This expanded article synthesizes Oleinik's core arguments, provides contextual analysis, and explores the broader implications for quantum physics, information theory, and consciousness research.

1. Introduction

Traditional interpretations of the special theory of relativity (STR) maintain that the speed of light in vacuum represents the ultimate speed limit for signal propagation. However, Oleinik challenges this notion by demonstrating that scalar and vector electromagnetic potentials—typically viewed as mathematical tools—can manifest physically and enable superluminal information transfer. This hypothesis does not contradict STR but rather reveals a hidden dynamic layer beyond standard field strengths.

2. Scalar and Vector Potentials as Informational Media

The core of Oleinik's argument lies in the distinction between electromagnetic field strengths (E and B fields) and potentials (scalar ϕ and vector A). While the former obey Lorentz invariance, the latter do not. The non-local nature of these potentials allows them to change instantaneously across space in response to localized physical changes. This phenomenon is supported by the Aharonov-Bohm effect, where electron wavefunctions shift phase due to potential fields even when electromagnetic fields are absent.

These potentials form what Oleinik terms the "own field" of a charged particle—a field that remains inseparable from the particle and permeates space. It acts not through photon exchange but via standing waves of matter, making it capable of transmitting changes in state without traditional energy transfer.

3. Mechanism of Superluminal Information Transfer

Superluminal signaling emerges from the non-local coupling of potentials with the environment. A local change in a charged particle (such as movement or spin alteration) modifies its own field. Because this field interacts non-locally with the surrounding space, the change propagates instantly to distant regions. This process underpins the concept of an informational field—a medium by which state changes can be communicated without breaching causality.

Importantly, such signaling is not bound by the wave-particle duality constraints of conventional photons. Instead, it arises from the self-action of quantum fields and reflects deeper symmetries (or symmetry breakings) in the spacetime structure.

4. Quantum Systems and Non-Locality

In quantum mechanics, entanglement has long served as a pillar of non-locality. Oleinik's model complements this by offering a field-theoretic framework for such connections. The informational field generated by each particle provides a medium through which entangled partners may remain in coherence, regardless of separation distance.

This interpretation also aligns with the concept of open quantum systems. As each particle maintains a continuous self-interaction via its own field, it cannot be fully isolated, thus naturally supporting entangled states and other holistic quantum behaviors.

5. Philosophical and Scientific Implications

The proposal of an informational field reshapes our understanding of physical interactions, consciousness, and the fabric of reality. If information can be transmitted without energy or momentum, then consciousness-related phenomena such as intention, attention, and non-local perception may have a theoretical substrate.

It also challenges the strict division between physical causality and informational correlation. In this view, the universe behaves as a fundamentally informational system—with potentials, rather than particles or waves, serving as the principal agents of change.

6. Conclusion and Future Directions

Oleinik's theory of the informational field invites a paradigm shift in physics. By elevating the status of scalar and vector potentials from auxiliary tools to primary carriers of information, it reopens foundational questions about the nature of interaction, distance, and simultaneity.

Further experimental and theoretical work is needed to validate the existence and behavior of informational fields. Cross-disciplinary exploration with neuroscience, quantum biology, and consciousness studies may yield transformative insights.

Ultimately, this model may serve as a bridge between the classical and quantum, the physical and conscious, and the local and non-local realms of experience and reality.