Review of: "Reconfigurable Intelligent Surface Constructing 6G Near-field Networks"

Muhammad Hussain

Potential competing interests: No potential competing interests to declare.

The paper "Reconfigurable Intelligent Surface Constructing 6G Nearfield Networks" by Yajun Zhao delves into the emerging field of near-field propagation in wireless communications, particularly facilitated by Reconfigurable Intelligent Surfaces (RIS). The author highlights the transformative potential of RIS in creating pervasive near-field environments crucial for 6G networks, addressing limitations of traditional far-field assumptions prevalent in earlier wireless generations (1G-5G). The paper reviews the fundamental principles of near-field propagation, distinguishing between reactive and radiating near-field regions, and emphasizes the unique characteristics of near-field effects, such as spherical wave models, spatial non-stationarity, and the broadband beam squint effect. These advancements promise to significantly enhance spatial resource utilization, data rates, and precision sensing in future 6G networks.

The paper also systematically explores the integration of RIS in constructing 6G near-field networks, presenting new frameworks and addressing inherent challenges. It discusses how larger antenna apertures and higher frequency bands, like millimeter waves and terahertz, facilitate near-field propagation. The RIS technology, with its low cost, low power consumption, and ease of deployment, is poised to revolutionize near-field wireless communication by providing a new network paradigm. The author aims to bridge the existing knowledge gap by offering a comprehensive review of current advancements and challenges, thus promoting further research and development in RIS-empowered near-field technologies.

The comments are as follows.

Concern # 1: How does the paper distinguish between the reactive and radiating near-field regions in terms of their electromagnetic characteristics?

Concern # 2: What specific advantages does RIS offer in the context of constructing near-field environments for 6G networks compared to traditional methods?

Concern # 3: How does the paper quantify the impact of near-field propagation on data rates and precision sensing in 6G networks?

Concern # 4: Can you elaborate on the differences between the spherical wave model (SWM) and the parabolic wave model (ParWM) as discussed in the paper?

Concern # 5: How does the concept of spatial non-stationarity manifest differently in near-field and far-field regions,

according to the paper?

Concern # 6: What are the implications of the broadband beam squint effect on the performance of near-field communications in 6G networks?

Concern # 7: What are the primary challenges identified in integrating RIS with near-field propagation, and what solutions does the paper propose?

Concern # 8: What future research areas does the paper suggest to further advance RIS-based near-field technologies?

Concern # 9: How does this paper's review of RIS-empowered near-field technologies fill the gaps left by existing literature?

Concern # 10: What potential practical applications of RIS in 6G near-field networks are highlighted, and how feasible are they according to the current technological advancements discussed in the paper?

You can explain the answers in paragraph form, but presenting them in a table as a comparison will provide a clearer and more enlightening overview of the article.