IEEE AWPL Special Cluster 2025 on
"Advances on Near-Field Electromagnetic Field for Integrated Sensing and Communication Systems"

Integrated Sensing and Communications (ISAC) is emerging as a key technology for sixth-generation (6G) wireless networks, and near-field electromagnetic effects are becoming increasingly critical for these systems. Firstly, to achieve high communication capacity and precise sensing resolution, extremely large-scale antenna arrays are expected to play a pivotal role. Since 6G ISAC systems will operate at higher frequencies, such as millimeter-wave and terahertz bands, the combination of large antenna arrays and high operational frequencies will result in pronounced near-field electromagnetic effects. Secondly, for detected targets such as cars, ships, and buildings, which are often larger than the antenna arrays themselves, near-field electromagnetic effects become even more significant in ISAC systems. Thirdly, Reconfigurable Intelligent Surfaces (RIS) are anticipated to improve the channel environment in ISAC systems and their large size will further amplify near-field electromagnetic interactions. Lastly, in ISAC systems, maintaining sufficient isolation between transmitting and receiving channels is critical to prevent interference, adding to the complexity of managing near-field electromagnetic challenges. In conclusion, near-field electromagnetic challenges are anticipated to play a major role in the design and development of ISAC systems, given the complex interactions between antenna elements and nearby scatterers. Effectively addressing these issues—including radiation, scattering, and coupling—will be critical to optimizing ISAC system performance and will also offer significant research opportunities.

This special issue aims to provide a rapid platform for publishing recent research findings in near-field electromagnetics for ISAC. It focuses on building foundational theories, offering conceptual frameworks, and developing technical methods for addressing near-field electromagnetic issues in ISAC systems, including radiation, scattering, and coupling problems. The objective is to bring together and connect leading researchers and experts from around the world, facilitating the exchange of their latest research in this area. Subjects of interest for this special cluster include, but are not limited to:

- Near field communication
- Near field sensing
- Near field coupling
- Near field antenna design and radiation theory
- Near field RCS evaluation
- Near field RIS design
- Near field radar echo simulation
- Near field beam forming method
- Near field wireless power transfer
- Near field channel modeling
- Near field measurement

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Prospective authors are encouraged to contact the Guest Editors for any questions or to determine the suitability of their contribution for this special cluster. Papers should be prepared following the same submission instructions as for regular IEEE AWPL manuscripts (four-pages technical content maximum and one reference page, double-column, IEEE format), available via the Information for Authors website. The authors should indicate in the cover letter to the Editor-in-Chief that the manuscript is being submitted in response to the Call for Papers for the focused cluster. Prospective authors should refer to the timeline below for key dates.

Key dates:

- Submission deadline: **March 31, 2025**
- First decision: May 15, 2025
- Revised manuscripts deadline: June 15, 2025
- Final decision: July 30, 2025
- Final manuscripts due by: September 1, 2025
- Online publication: Shortly after final manuscript submission
- Cluster publication: November (or December) 2025 issue of AWPL