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Wang Junling received his B.E. and M.S. degrees from China University of Petroleum, Qingdao, China, in 2005 and 2008, respectively, respectively, and his Ph.D. degree from Beijing Institute of Technology (BIT) in 2013. In 2010, he was an exchange student in the Department of Signal Theory and Communications, Universitat Politècnica de Catalunya. He has been with the School of Information and Electronics at BIT since 2013, where he is currently an Associate Professor. His research focuses on satellite detection and imaging, and radar signal processing.

He led the development of China's first bistatic ISAR imaging system for space targets, achieving the nation's first 3D images of space targets using interferometric techniques. He has published more over 70 SCI/EI-indexed papers in international journals and conferences, including IEEE TGRS, IEEE TAES, IEEE SENS J, J GUID CONTROL DYNAM, Remote Sensing, IET RADAR SONAR NAV., and CHINA COM. He also holds more than 20 patents.

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Speech Title (English):

Symmetry Features in Space Target Radar Detection and Imaging

Speech Abstract

In the field of space target radar detection and recognition, significant progress has been made through various technical approaches, particularly in the areas of target feature extraction, sensor design, and information processing. However, research specifically focused on the exploration and application of symmetry features remains relatively limited and lacks in-depth systematic investigation. This report comprehensively analyzes the symmetry features in space target radar detection and recognition from three perspectives: the target, the sensor, and information processing. It covers target geometric symmetry, motion symmetry, spatiotemporal symmetry of echoes, signal periodic symmetry, symmetry constraints in data processing, symmetry in the transformation domain, and symmetry in radar sensor networks. By considering these different aspects, this paper highlights the potential for symmetry to enhance detection accuracy, reduce computational complexity, and improve target recognition performance. Additionally, it provides models for these symmetry features, methods for feature extraction, and discusses the benefits of incorporating these features into radar systems. Existing technological solutions and their limitations are reviewed. Finally, an outlook on future research directions is presented, including the integration of symmetry with emerging technologies such as sparse representation, deep learning, and optimization techniques, which are expected to significantly enhance target detection, imaging accuracy, and overall system performance.