367
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Title:Special phenomena of the shadow region in the high resolution synthetic aperture radar image due to synthetic aperture
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Abstract:With the development of several High Resolution (HR) Synthetic Aperture Radar (SAR) systems, many special phenomena appear in the SAR image, especially for the SAR image with millimeter wave. We firmly believed that every detail in the SAR image should have its own special mechanisms and these details may provide some key clues for us to build up the frame work on understanding the SAR image. The synthetic aperture is one of the important particularities about SAR, and the radar is moving during the data is collected, which leads many special phenomena in the SAR image; one of these is the shadow with blurred boundary. In this work, the effect on the shadow region in the SAR image by synthetic aperture is expanded on. The blurred boundary of the shadow is analyzed using imaging formation theory, and the Quadratic Phase Errors (QPE) brought by the synthetic aperture progress is deduced for the first time, which builds up the relationship between the parameters of the shadow caster and the behavior of the shadow in the SAR image. It is found that the QPE is approximately a linear function of the height of the shadow caster. Furthermore, an approach for shadow enhancement based on height variant phase compensation is proposed and it could provide a better effect on shadow enhancement than the traditional technique called Fixed Focus Shadow Enhancement (FFSE), which is proved by theoretical analysis and experiments. Based on the analysis, some typical application of the about the shadow region. It is expected that the work in this paper could be some helpful for the SAR image understanding and the microwave imaging with high resolution. shadow in SAR image is designed and some mini-SAR image with Ku-band is analyzed about the shadow region. It is expected that the work in this paper could be some helpful for the SAR image understanding and the microwave imaging with high resolution. © Springer Science+Business Media, LLC

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