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## Article Information

### Joint TNT and RDX detection via quadrupole resonance

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Summary:Quadrupole resonance (QR) technology has been receiving increasing attention for explosive detection in applications including landmine detection. It can be used as a confirming sensor for buried plastic landmine detection by detecting the explosives within the mine. Since a single mine can contain more than one type of explosives (e.g., trinitrotoluene (TNT) and (RDX) compound), a detector designed to detect only one type of explosive may not provide the best detection. We focus herein on the joint detection of TNT and RDX explosives for the landmine detection via the QR sensor. To mitigate the RF interferences (RFIs) associated with the QR measurements, we apply a doubly constrained robust Capon beamformer (DCRCB) to perform the spatial beamforming by exploiting the spatial correlation of the RFIs. Based on the output of the spatial DCRCB, we devise a generalized likelihood ratio test (GLRT) for the joint TNT/RDX detection, which is referred to as the DCRCB-GLRT detector. We show that our detector has the constant false alarm rate (CFAR) property and that the detection variable obeys a $x^2$ -mixture distribution in the mine-free scenario. The effectiveness of the proposed DCRCB-GLRT detector is demonstrated with the experimental data collected by Quantum Magnetics, Inc.

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