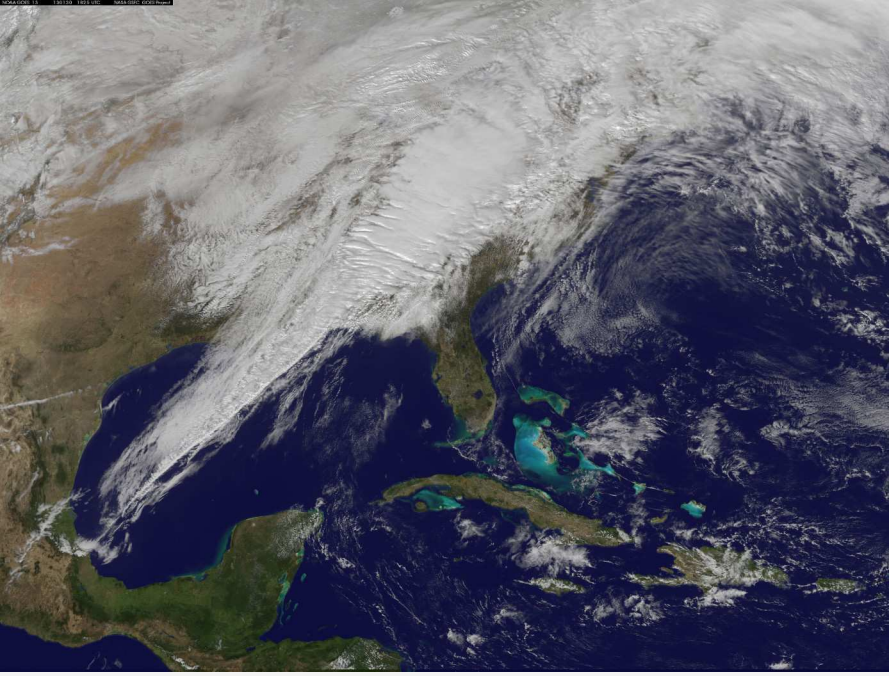

National Aeronautics and
Space Administration

Sensors

Frequency Diversity Pulse Pair Algorithm for Mitigation of Radar Range-Doppler Ambiguity

A solution for the well-known range ambiguity.

Doppler radar is the go-to tool for moving target range and velocity detection but its limiting capabilities has caused some challenges onboard fast moving platforms. NASA Goddard has developed technology that mitigates some of these concerns in aggressive applications.

BENEFITS

- Enhanced accuracy on rapid moving platforms
- Reduced ambiguity

technology solution

THE TECHNOLOGY

This technology mitigates the Doppler ambiguity by creating an innovative frequency. This frequency diversity technique takes advantage of the recent development in digital waveform generation and digital receiver technologies by transmitting a pair of pulses (or more pulses) with slightly shifted center frequencies in each pulse repetition period. Radar return signals from these pulses can be separated by the digital filters implemented in the digital receiver. In Doppler radar operation, the maximum unambiguous range is determined by the radar transmission pulse repetition time. This unique frequency diversity technique is implemented by alternating the order of the pulse pair with center frequencies as f1, f2, and f2, f1, then integrate the phase estimates of f1/f2 pulse pair and f2/f1 pulse pair in equal numbers. This approach will cancel the phase shift as a function of range between the pulses to enable the retrieval of Doppler phase. Although this method is more advanced, it also has its inherent limits, such as increased phase error and increased complexity in radar hardware to transmit and receive dual polarized signals. Despite its faults, it is a step forward in the evolution of the Doppler radar and its growing applications.

APPLICATIONS

The technology has several potential applications:

- Weather Tracking
- Aviation
- Automotive

PUBLICATIONS

Patent No: 10317521

More Information

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