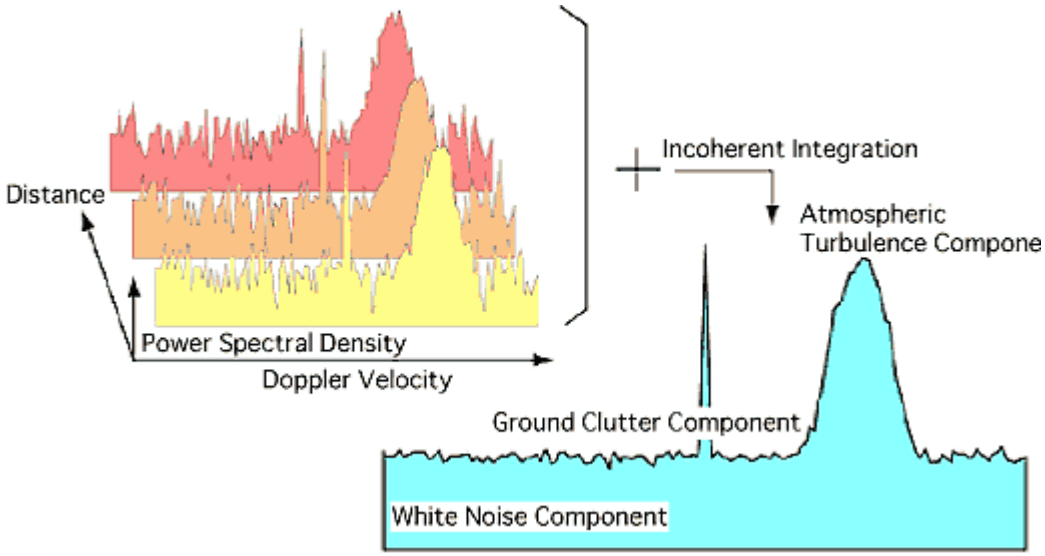
Frequency Domain Integration (Incoherent Integration)

The phase of the complex time series signal obtained by the orthogonal detection of the signal received by the radar rotates in proportion to the apparent velocity of the scatterer. The Doppler spectrum representing the distribution of the received power for each scatterer velocity can be determined by Fourier transform of this complex time series signal. The horizontal axis represents what is referred to as the Doppler velocity; the sharp peak at the center is called a ground clutter, that is, the signal reflected by static scatterers (such as a mountain) in the surrounding area. The wide peak on the right represents a signal scattered by atmospheric turbulence.

The Doppler spectrum characteristically contains a significant amount of noise, and the atmospheric scattering component tends to be masked by this noise. However, through the application of incoherent integration, where multiple Doppler spectra are accumulated, the SNR can be improved. As a result of this integration, repeated ni times, the signal power becomes x ni. On the other hand, the power of white noise is x ni1/2 (the square root of ni); as a result the SNR becomes x ni1/2 (the square root of ni).



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