

RADAR SYSTEMS ANALYSIS AND DESIGN USING MATLAB®

2 Basic Pulsed and Continuous Wave (CW) Radar Operations

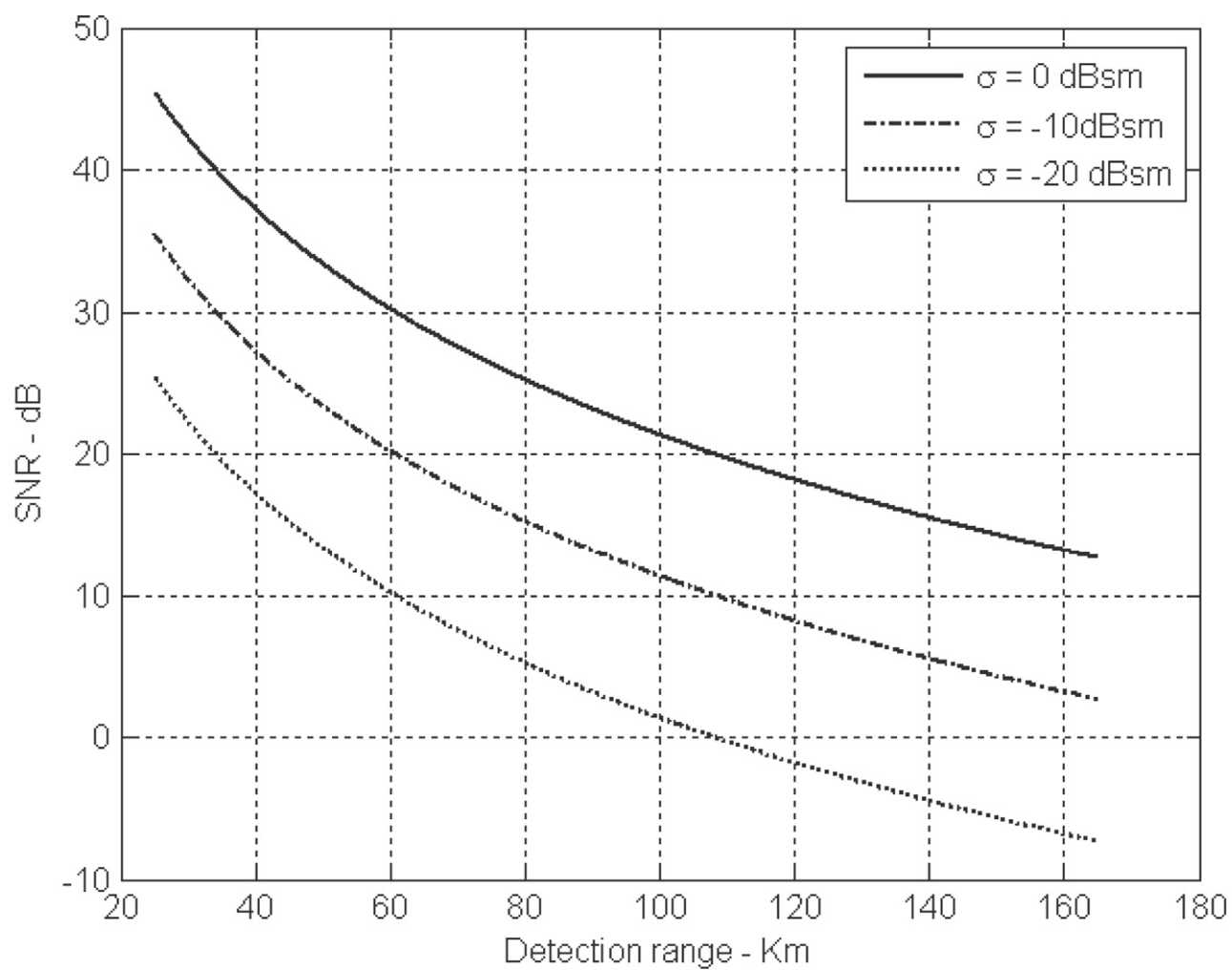


Figure 2.1a. SNR versus detection range for three different values of RCS.

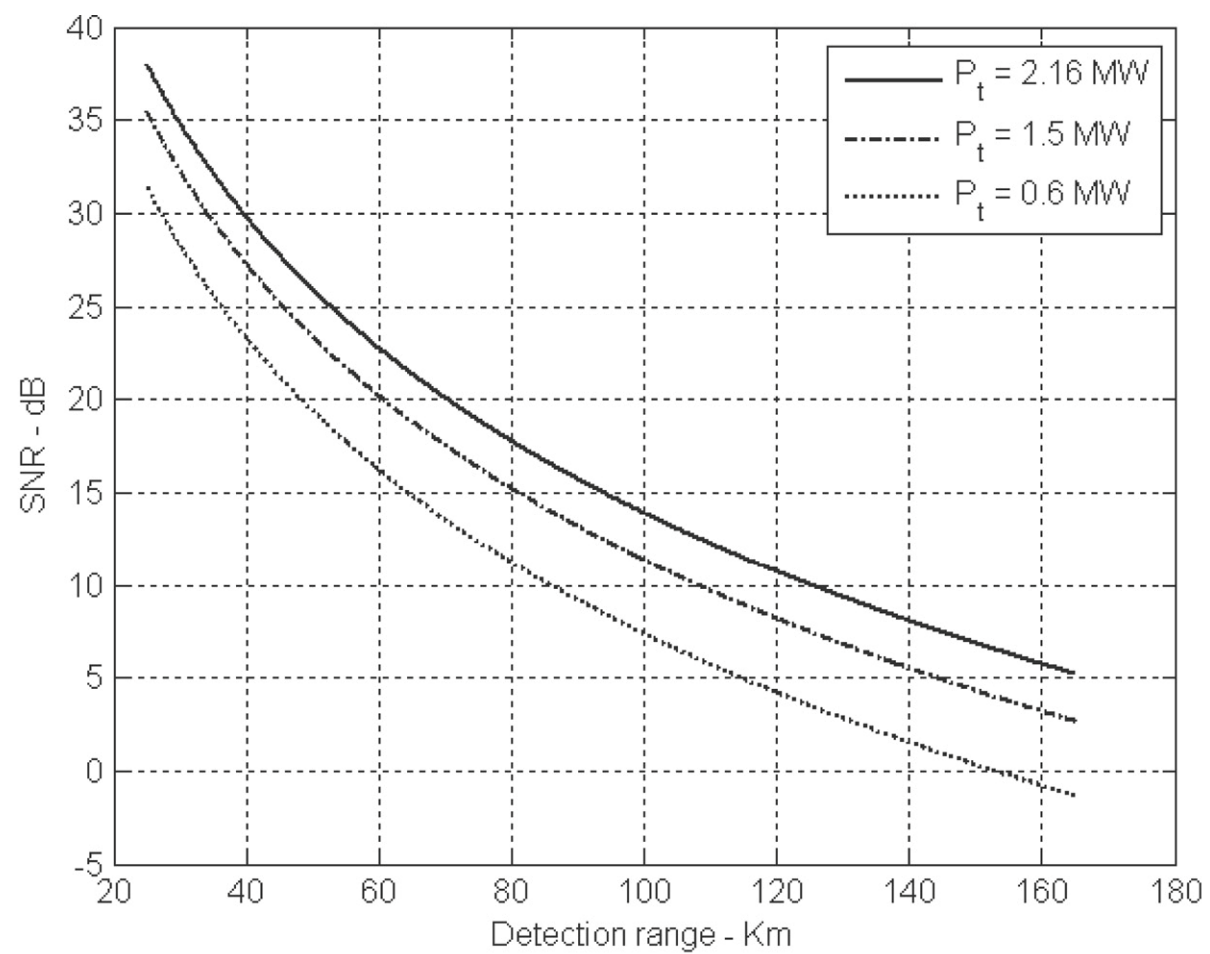


Figure 2.1b. SNR versus detection range for three different values of radar peak power.

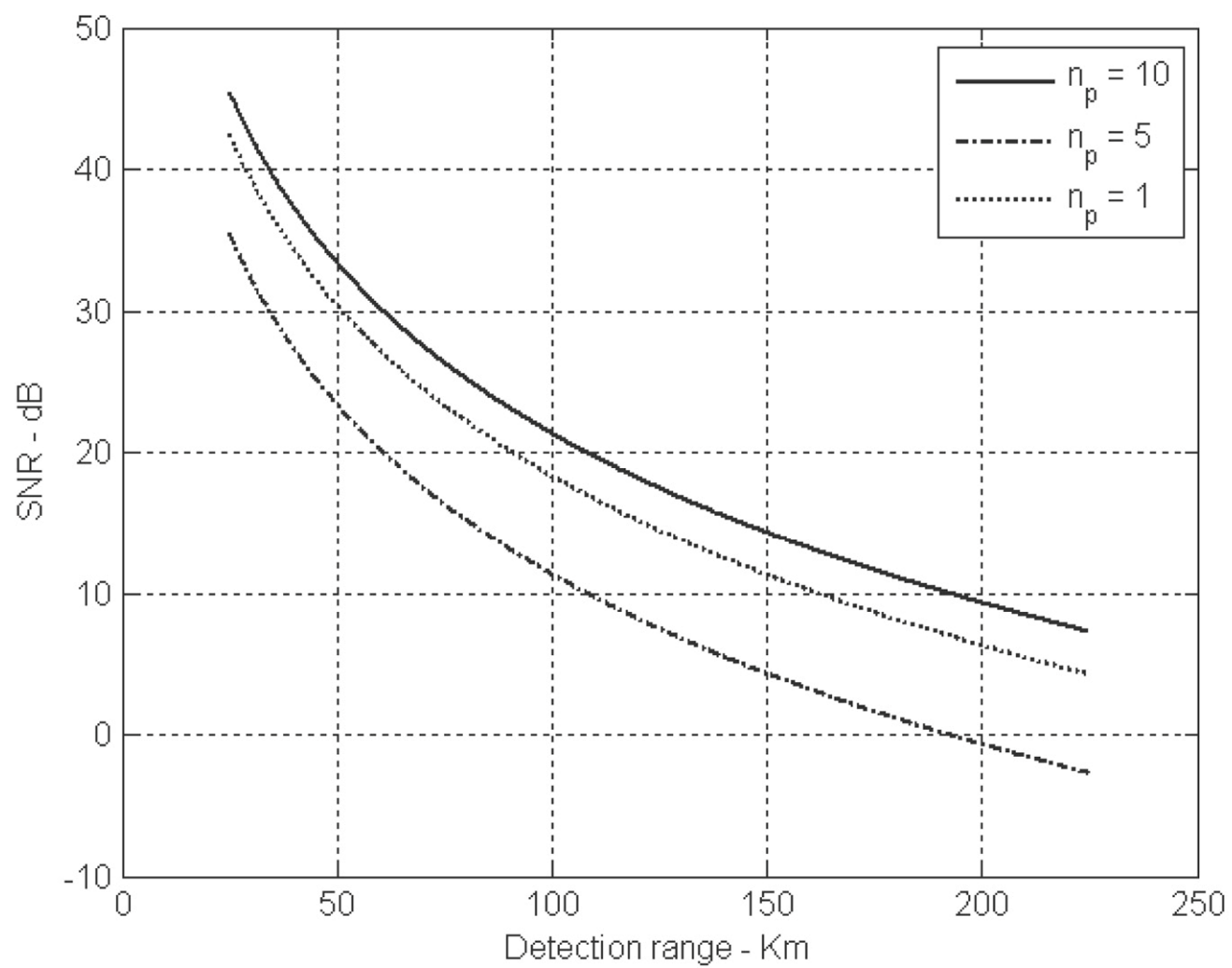


Figure 2.2a. Typical output generated by the function “*lprf_req.m*.”

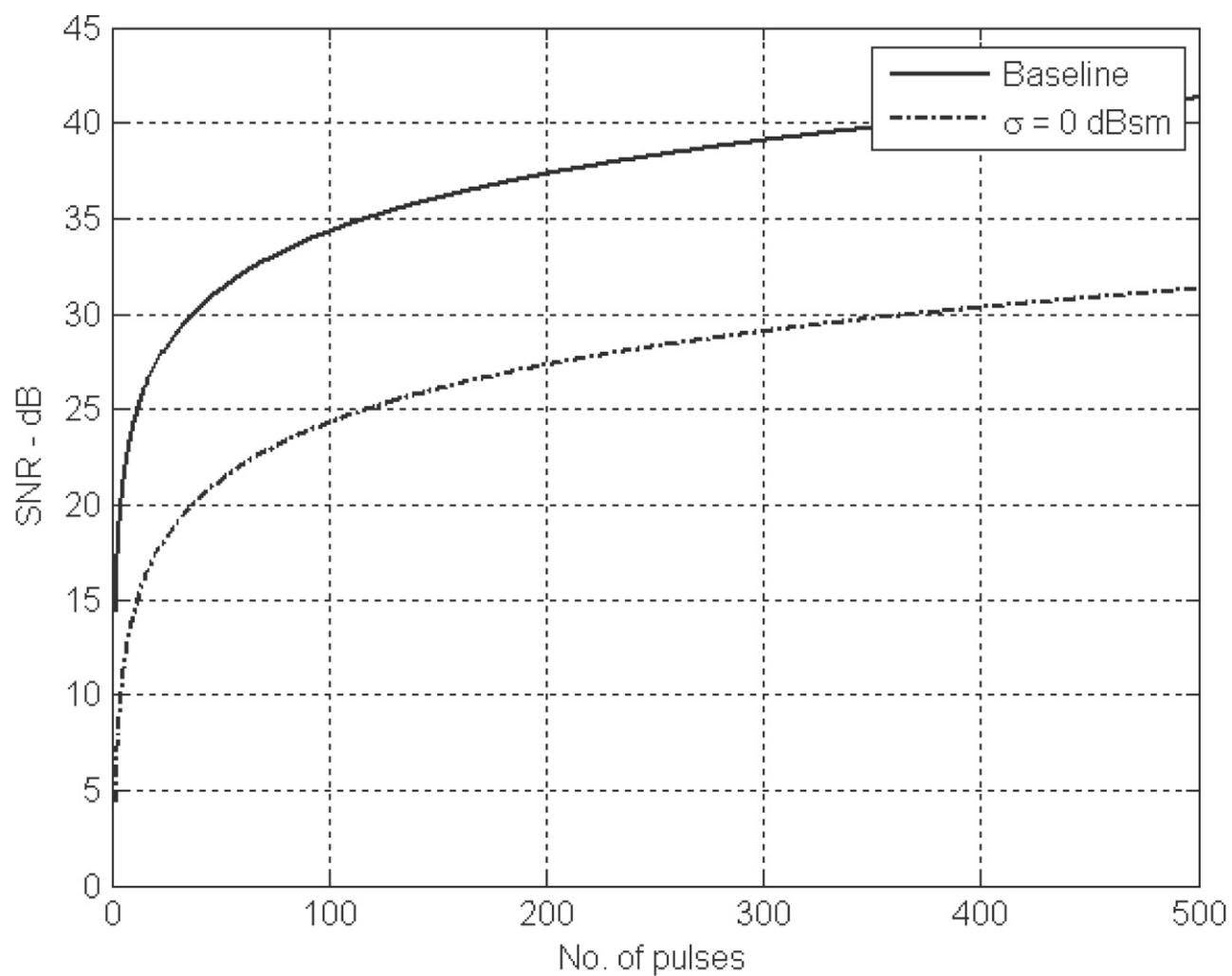


Figure 2.2b. Typical outputs generated by the function “*lprf_req.m*.”

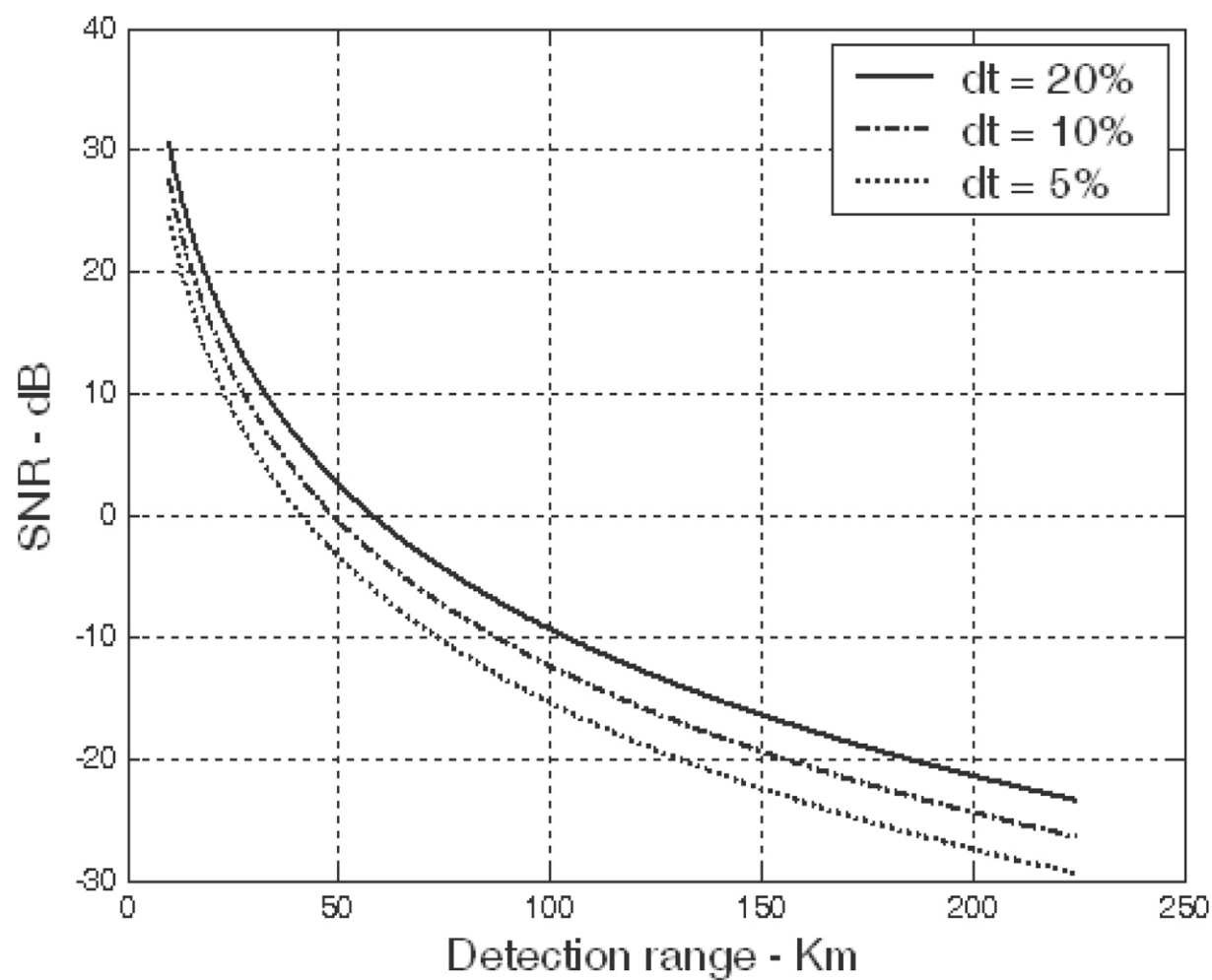


Figure 2.3. Typical output generated by the function “*hprf_req.m*,” using parameters in next example.

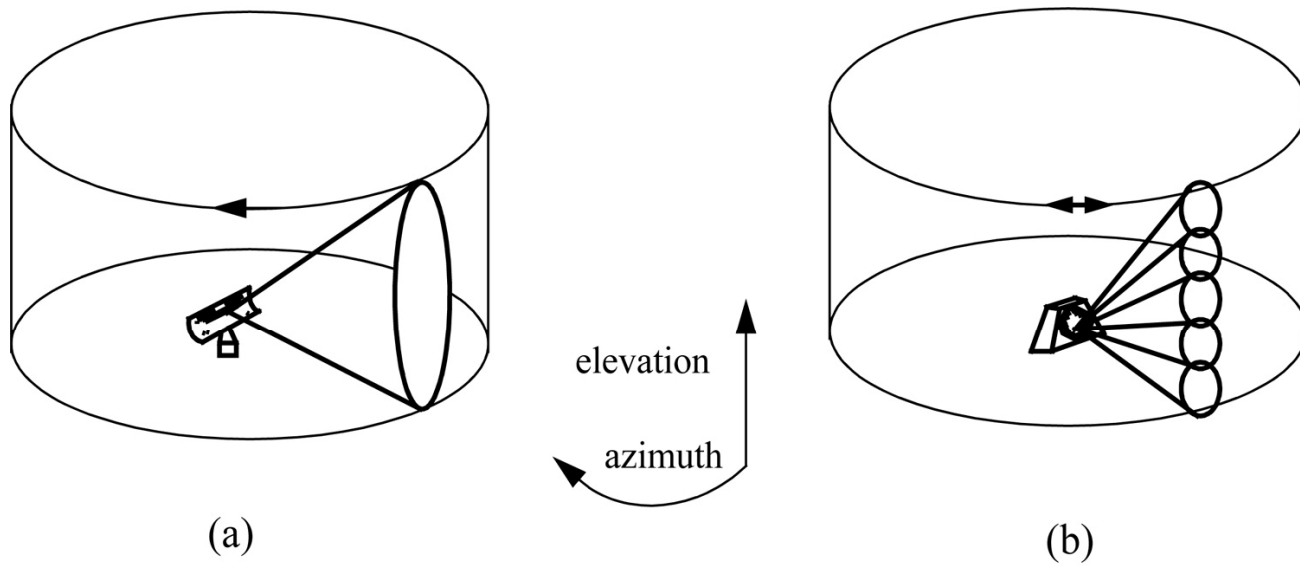


Figure 2.4. (a) 2-D fan search pattern; (b) stacked search pattern.

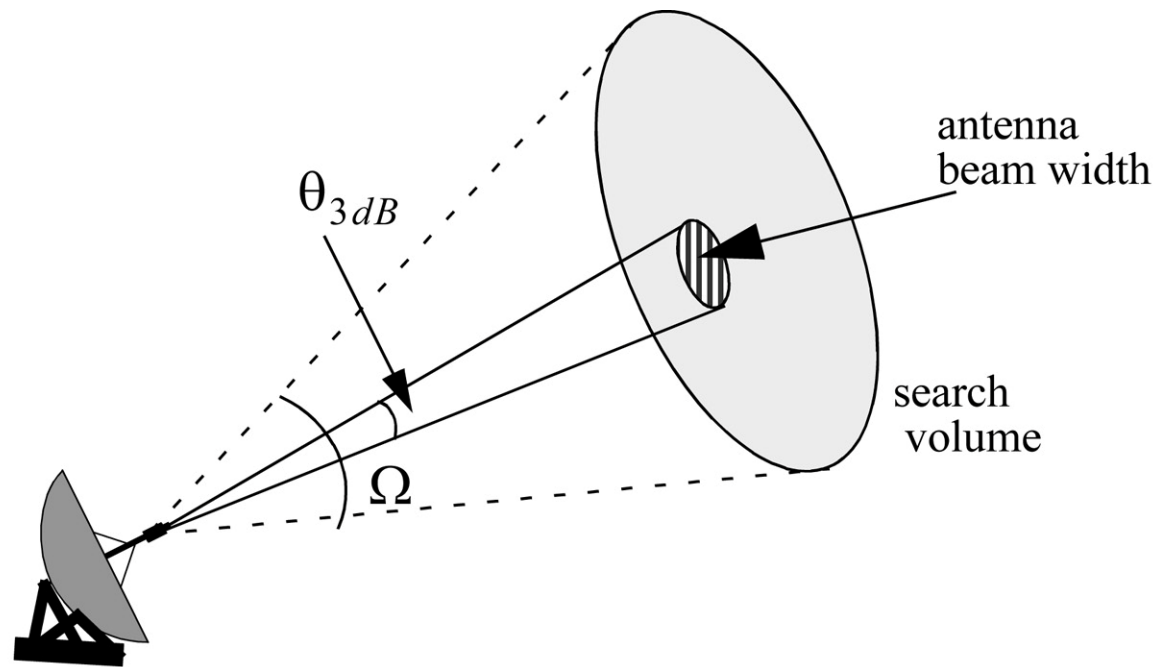


Figure 2.5. A cut in space showing the antenna beam width and the search volume.

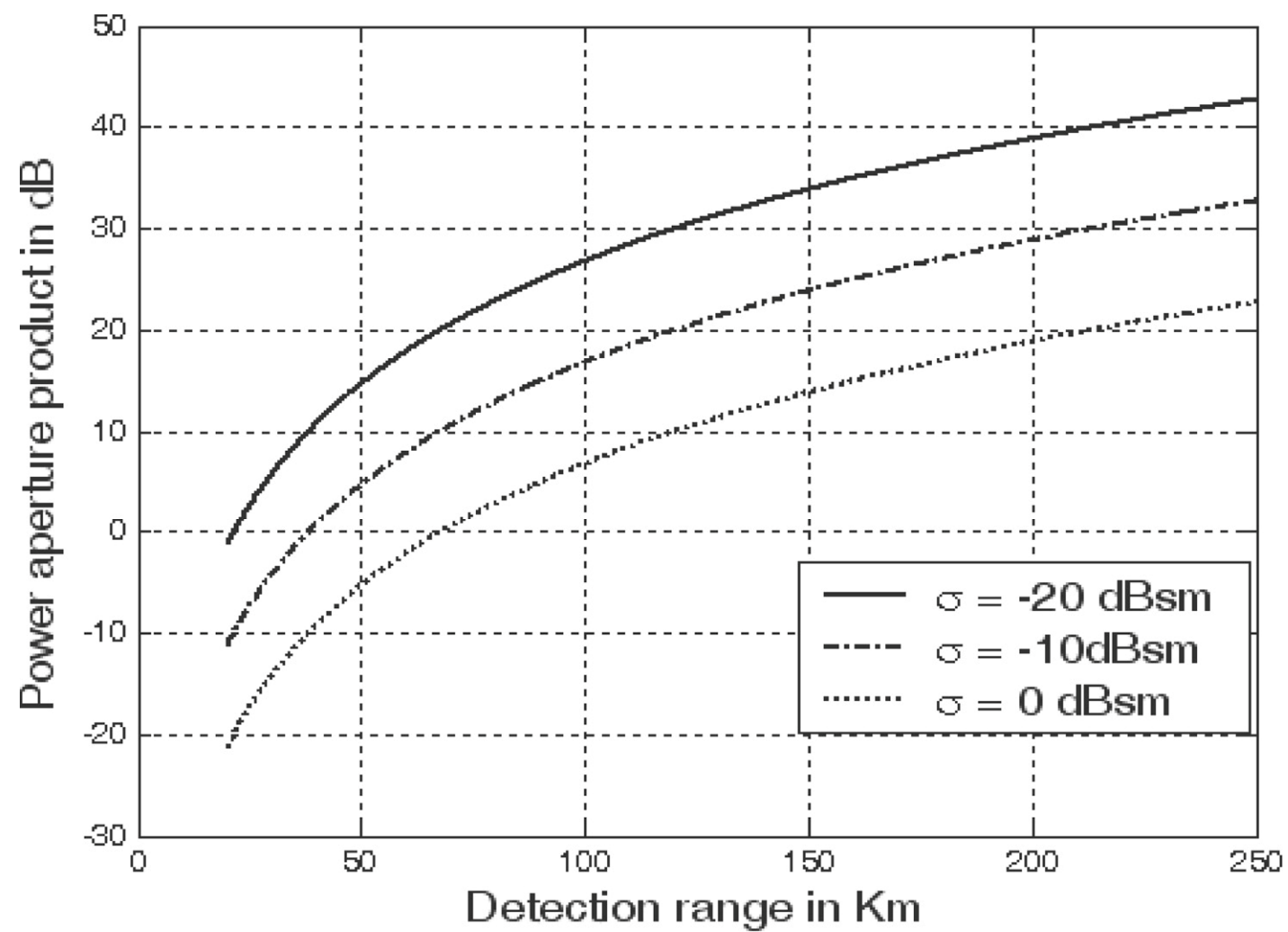


Figure 2.6a. Power aperture product versus detection range.

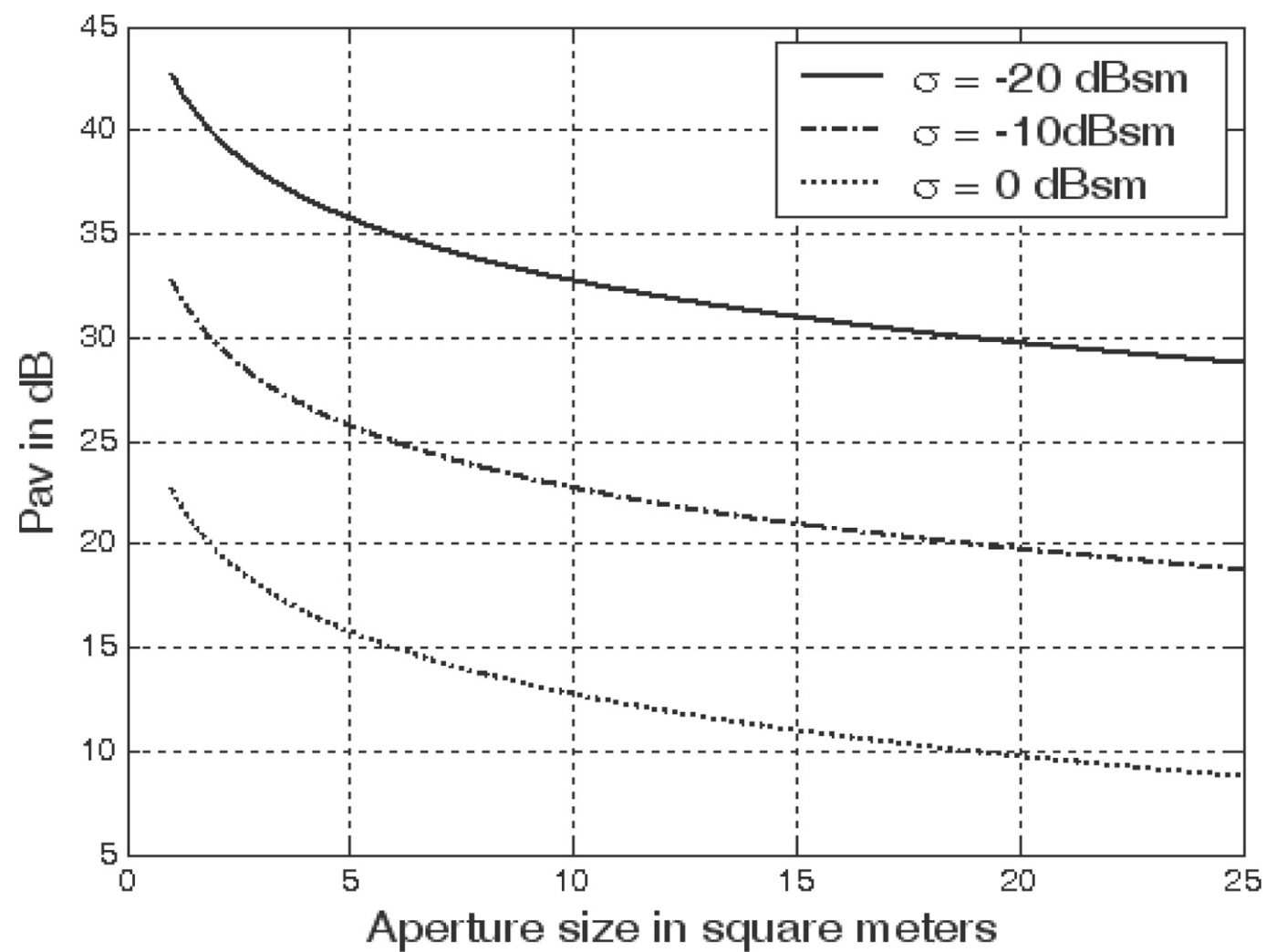


Figure 2.6b. Radar average power versus power aperture product.

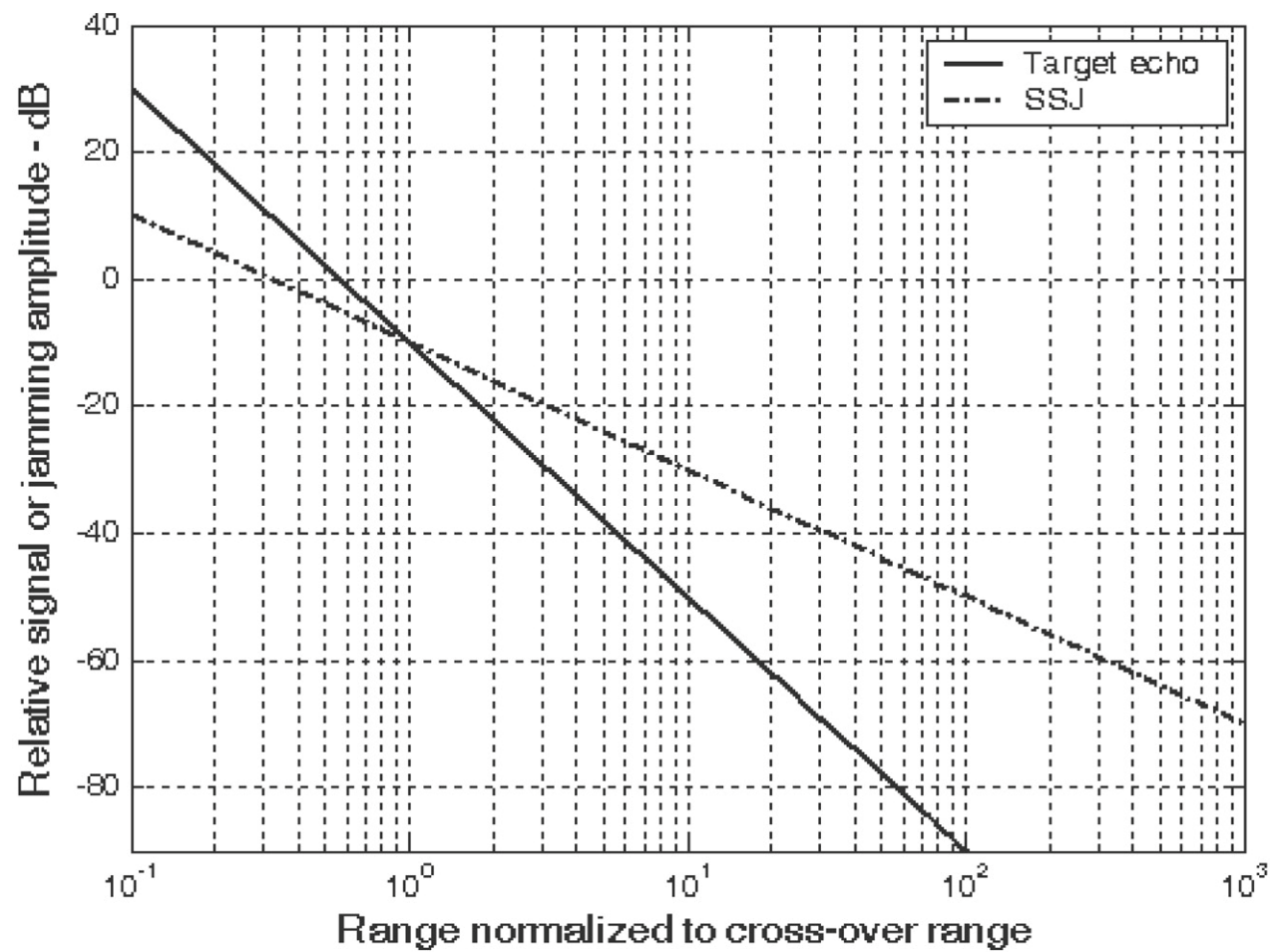


Figure 2.7a. Target and jammer echo signals using the input parameters defined on pp. 42.

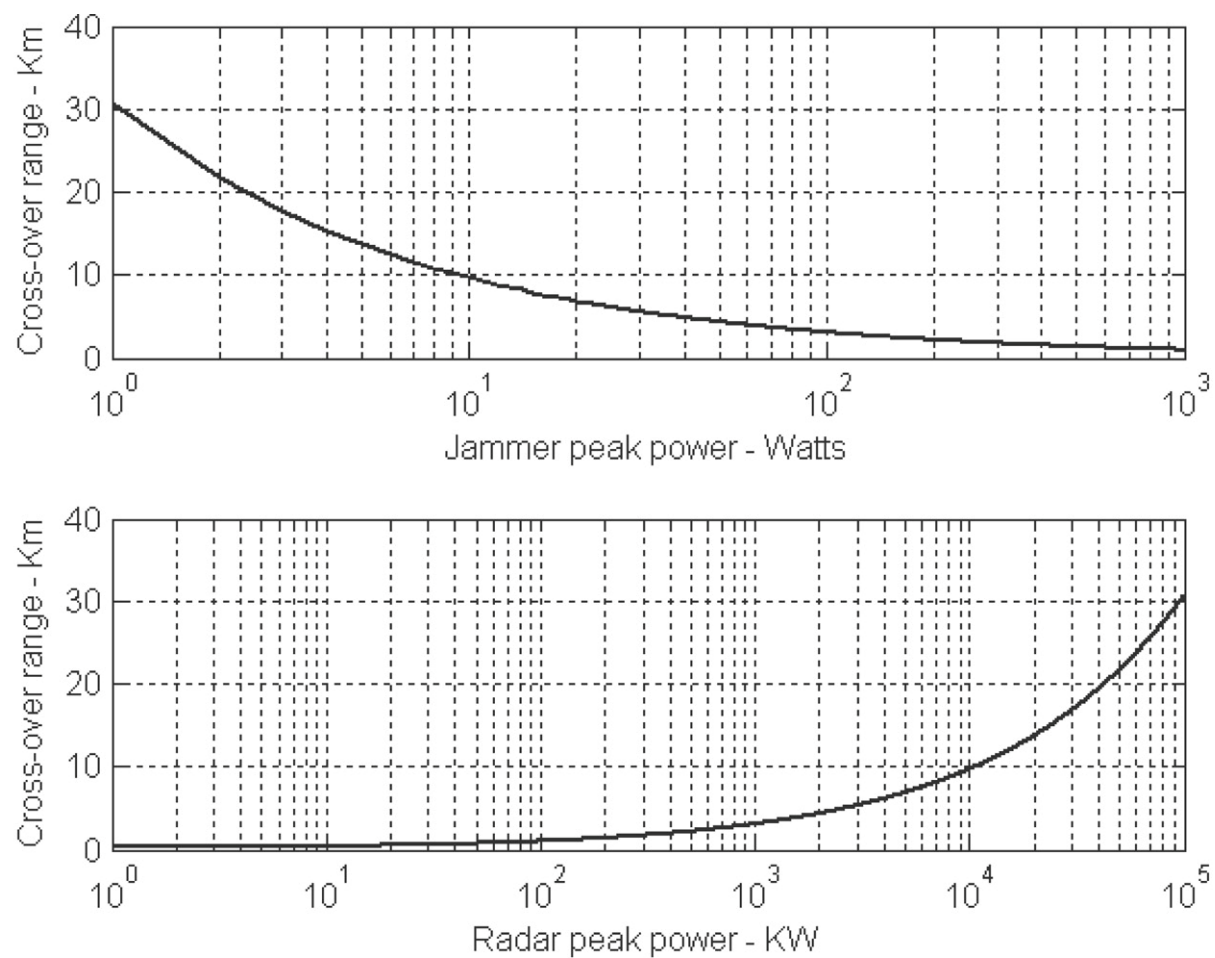


Figure 2.7b. Cross-over range versus jammer and radar peak powers corresponding to the example used in generating Fig. 2.7a.

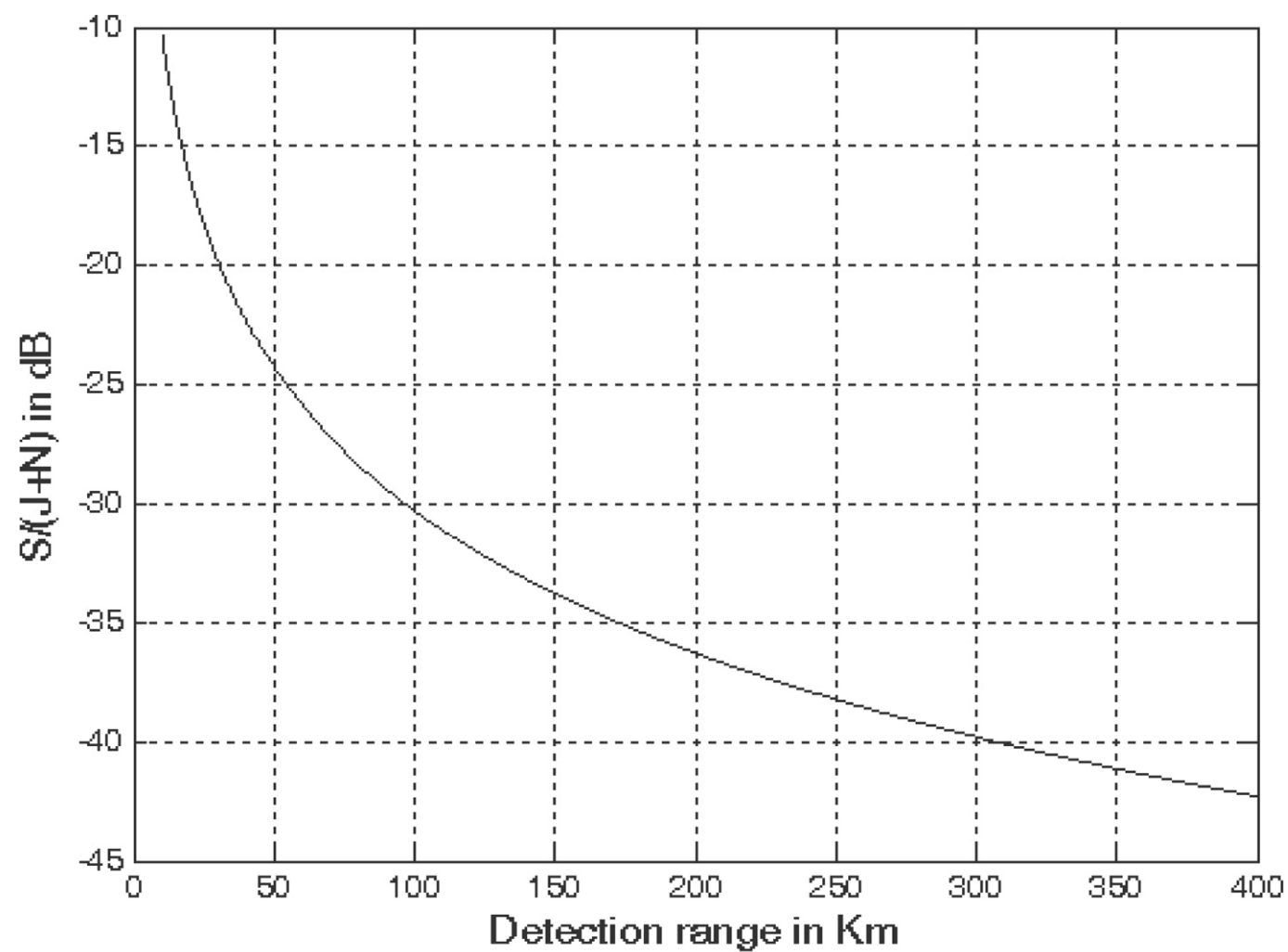


Figure 2.8. $S/(J+N)$ versus detection range.

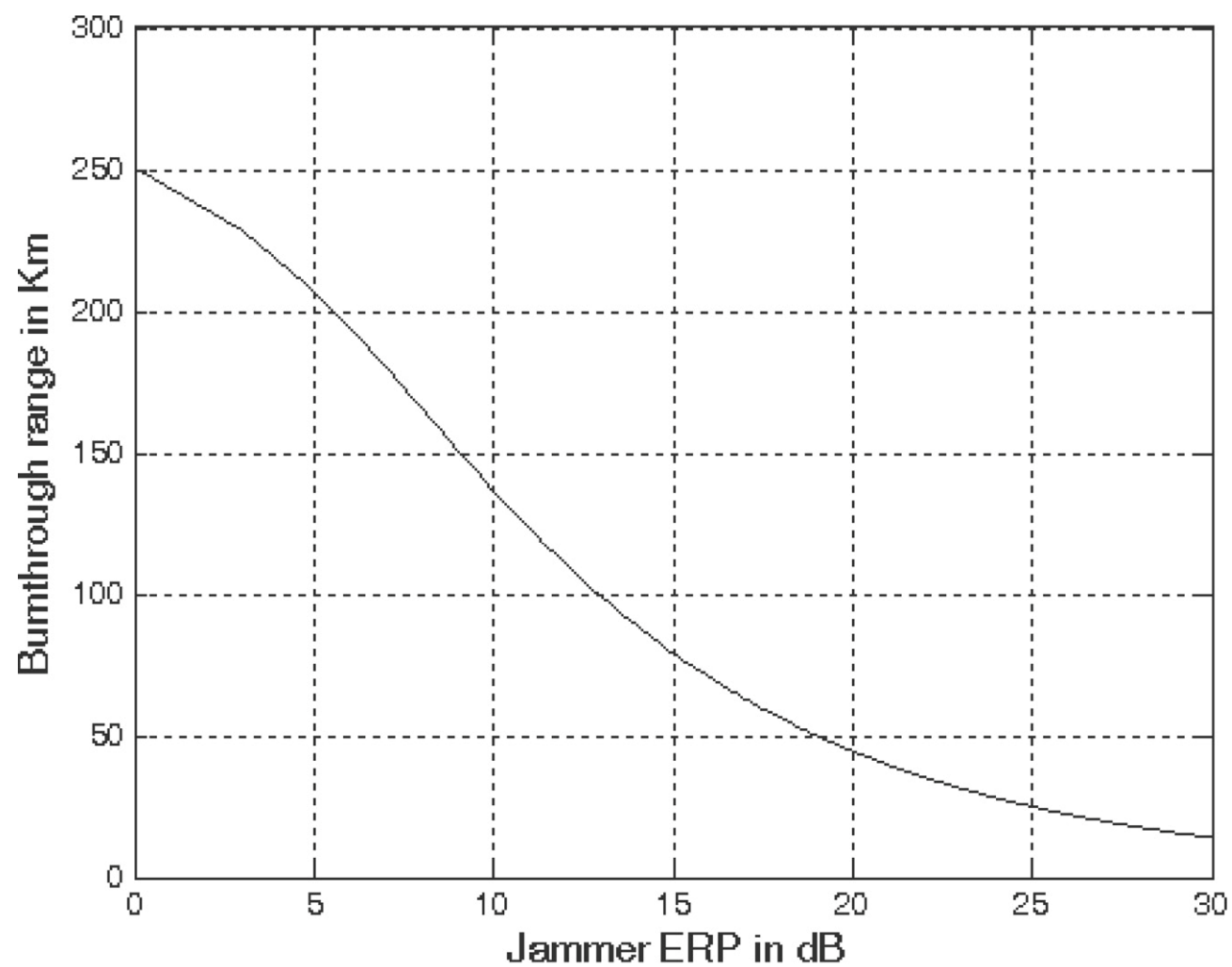


Figure 2.9. Burn-through range versus ERP. $S/(J+N) = 15$ dB.

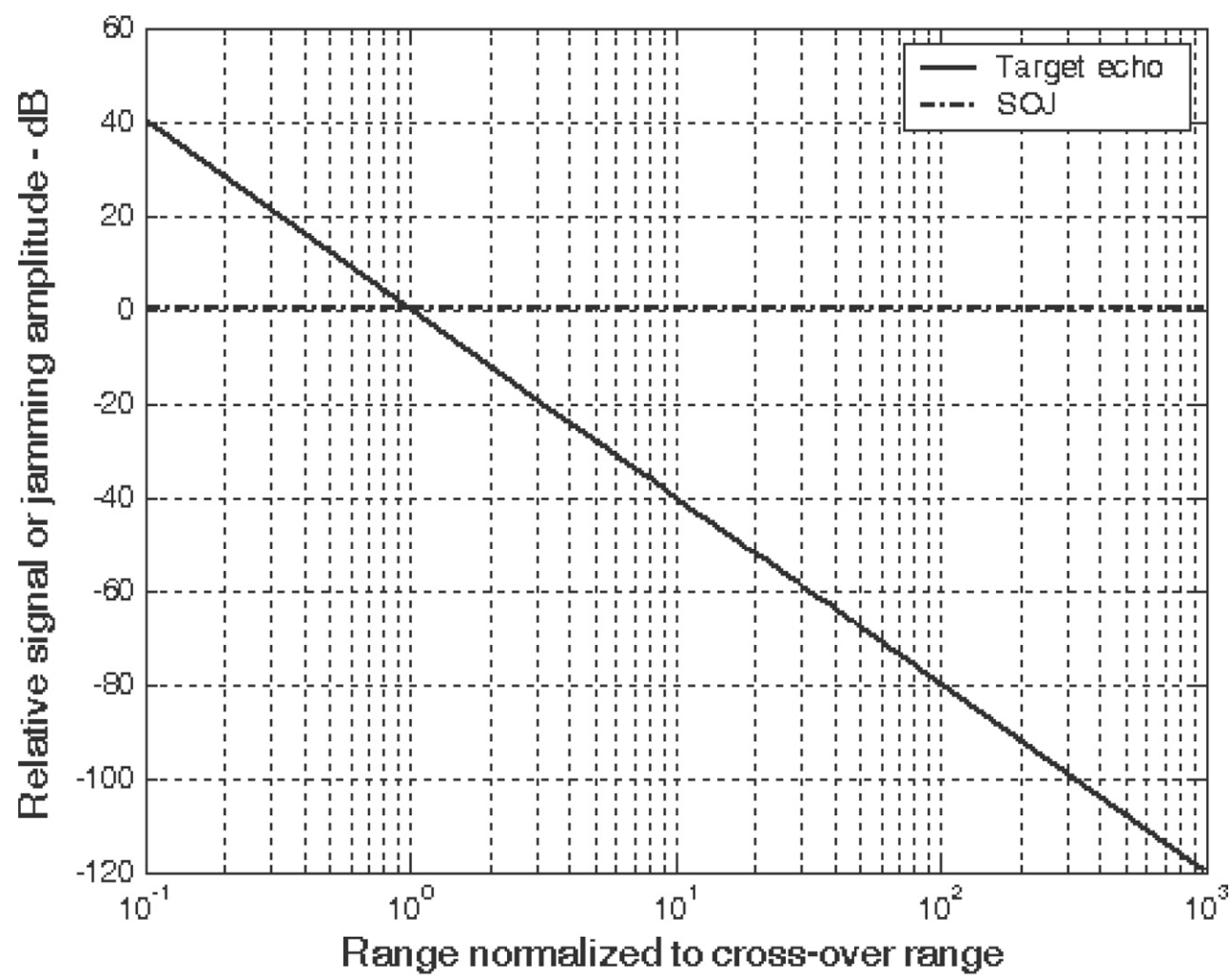


Figure 2.10. Target and jammer echo signals.

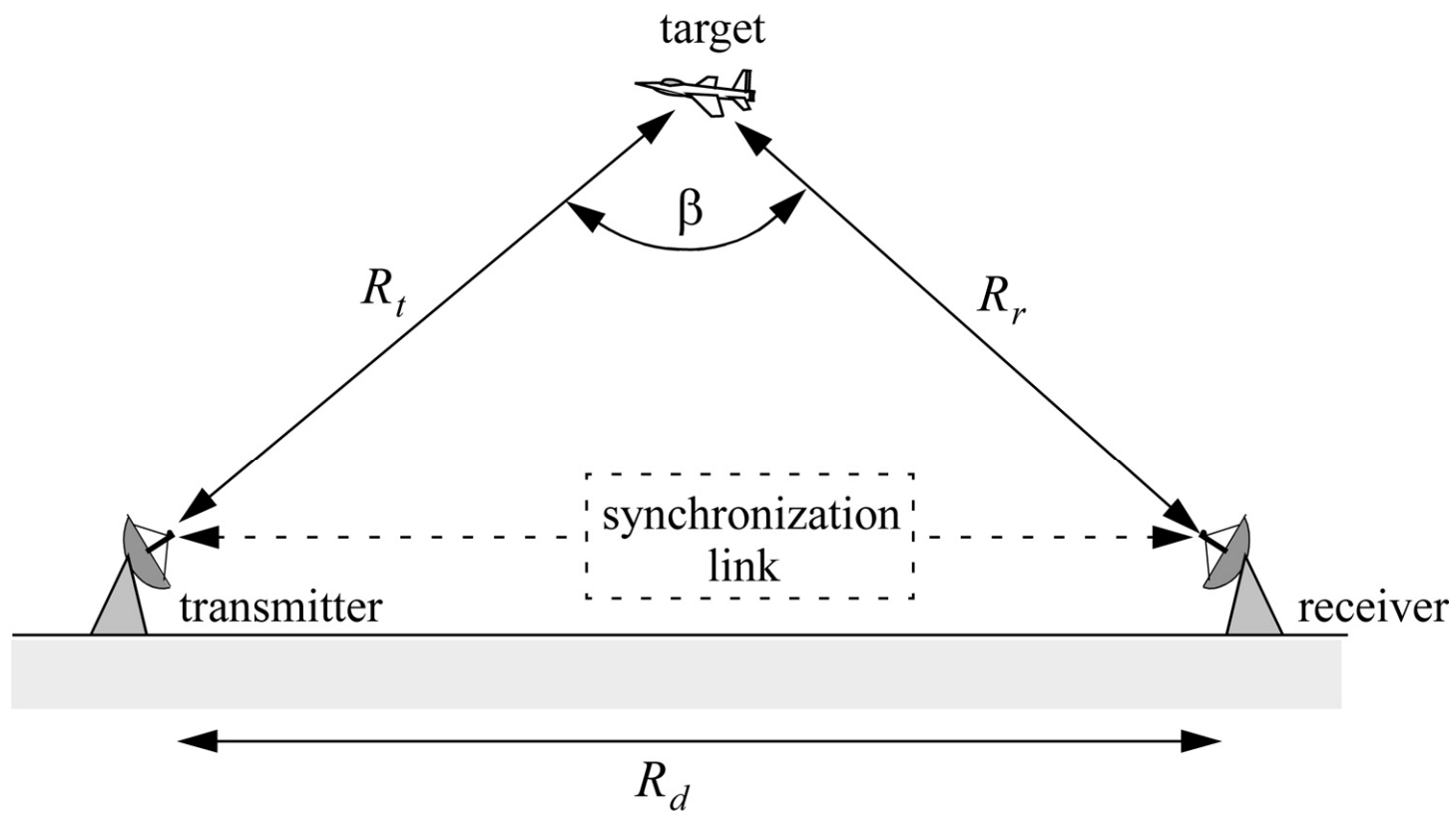


Figure 2.11. Bistatic radar geometry.

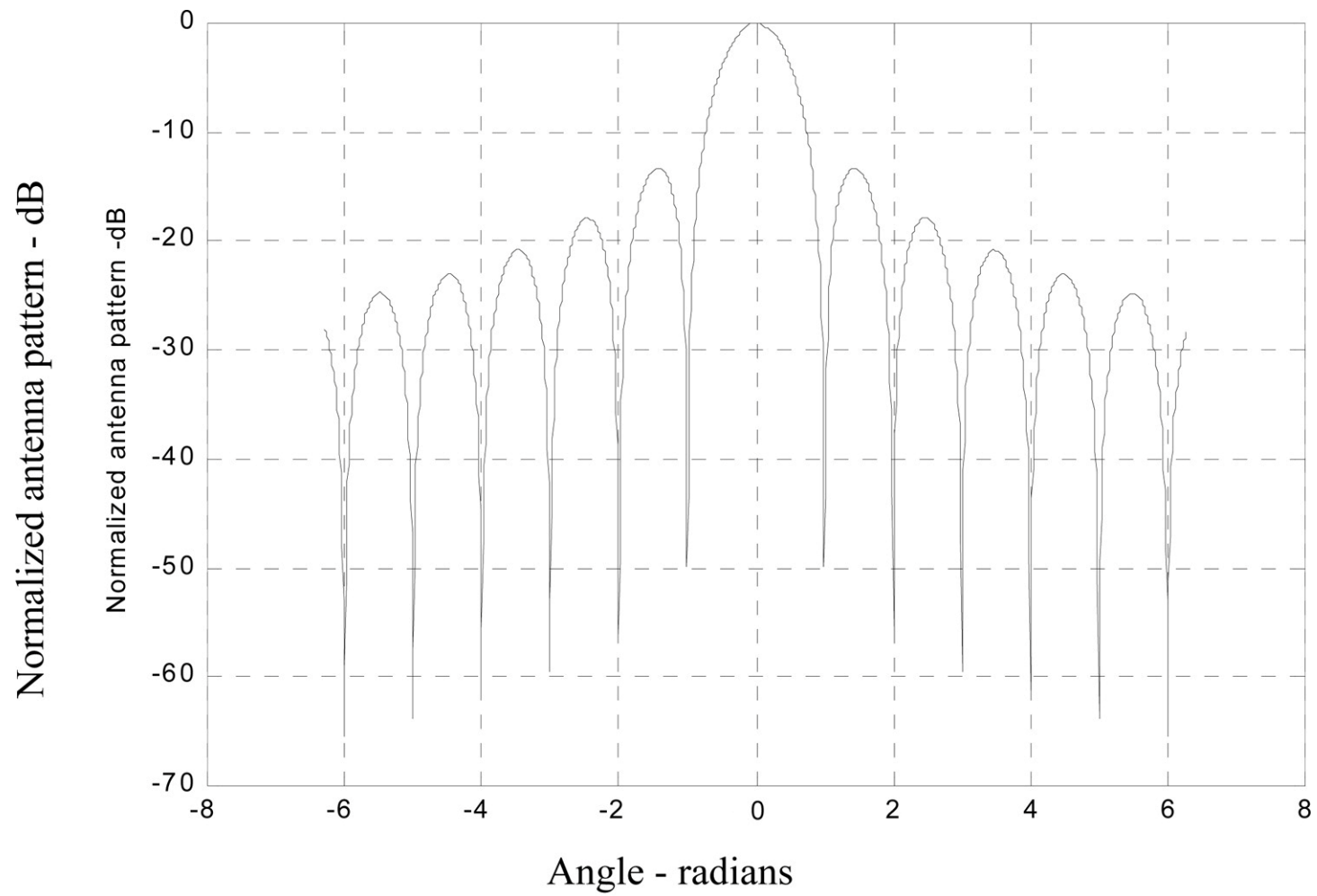


Figure 2.12. Normalized ($\sin x/x$) antenna pattern.

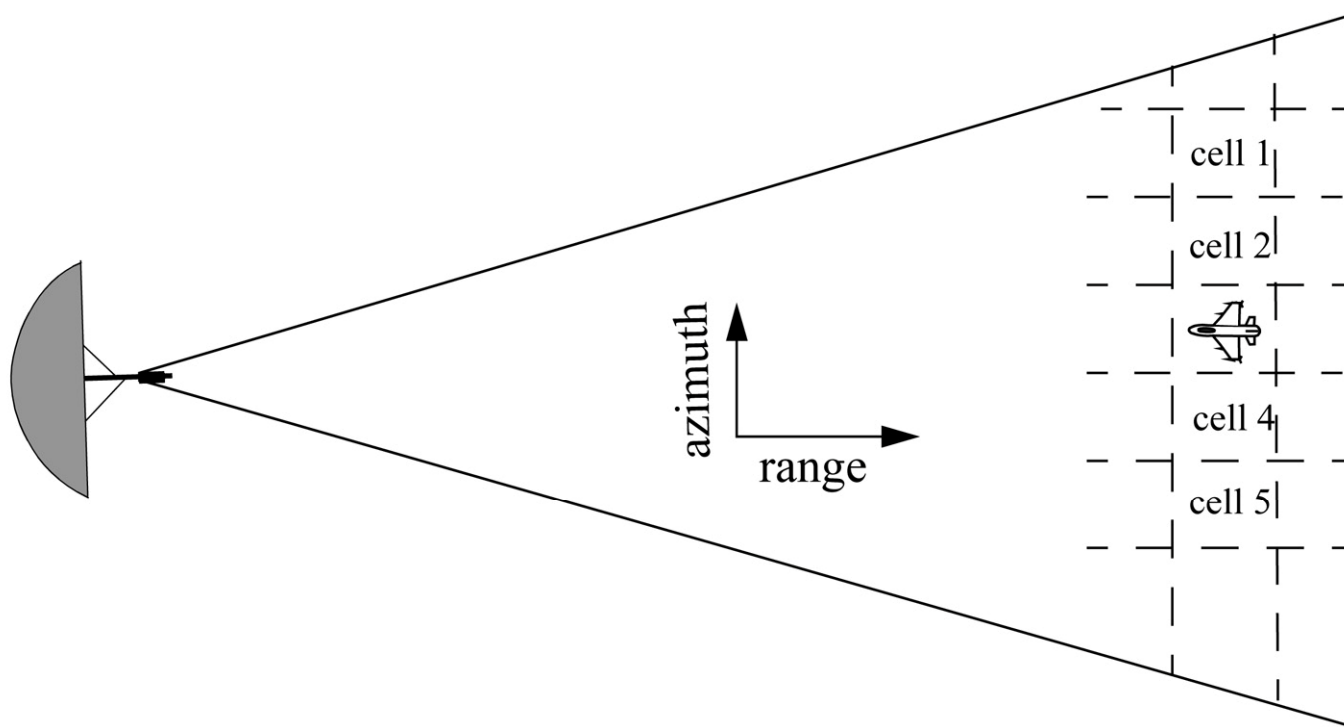
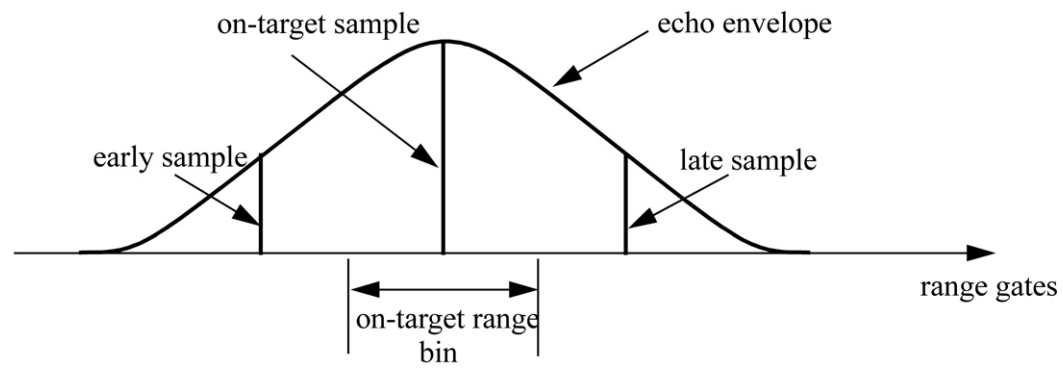
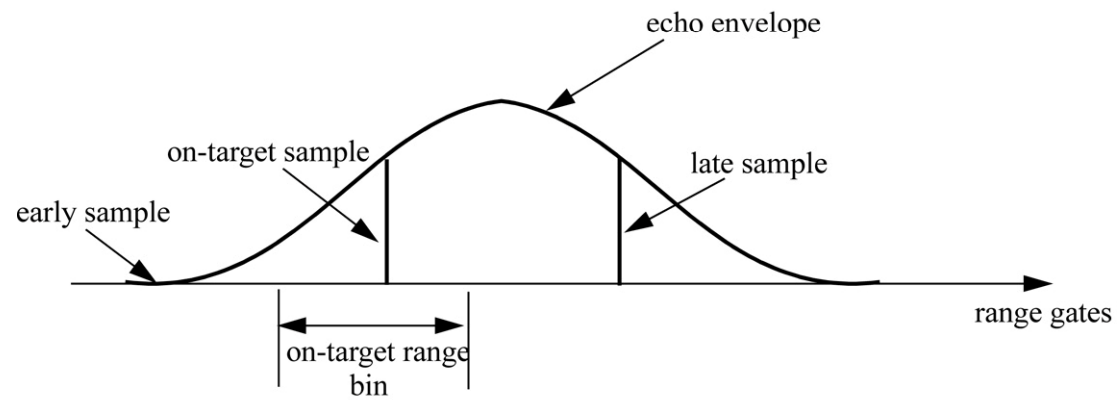


Figure 2.13. Illustration of collapsing loss. Noise sources in cells 1, 2, 4, and 5 converge to increase the noise level in cell 3.

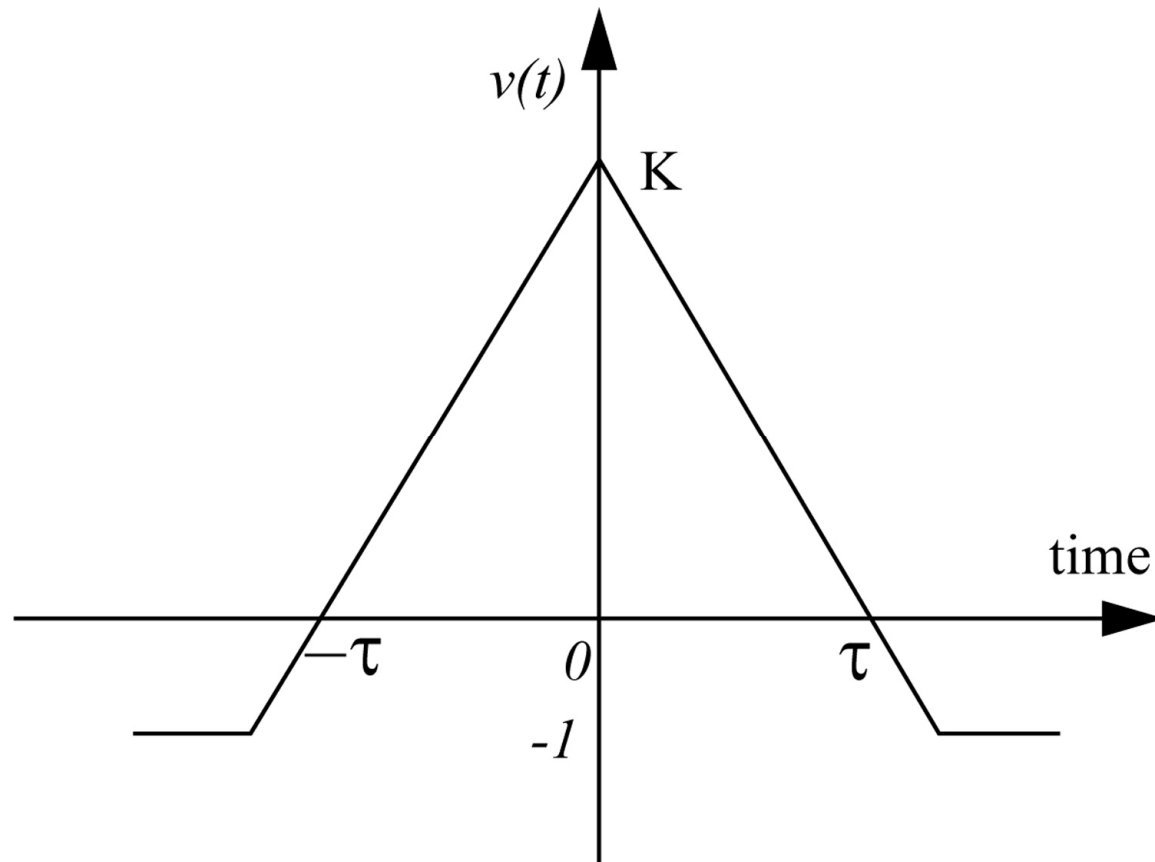


(a) Target on the center of a range gate



(b) Target on the boundary between two range gates

Figure 2.14. Illustration of range gate straddling.



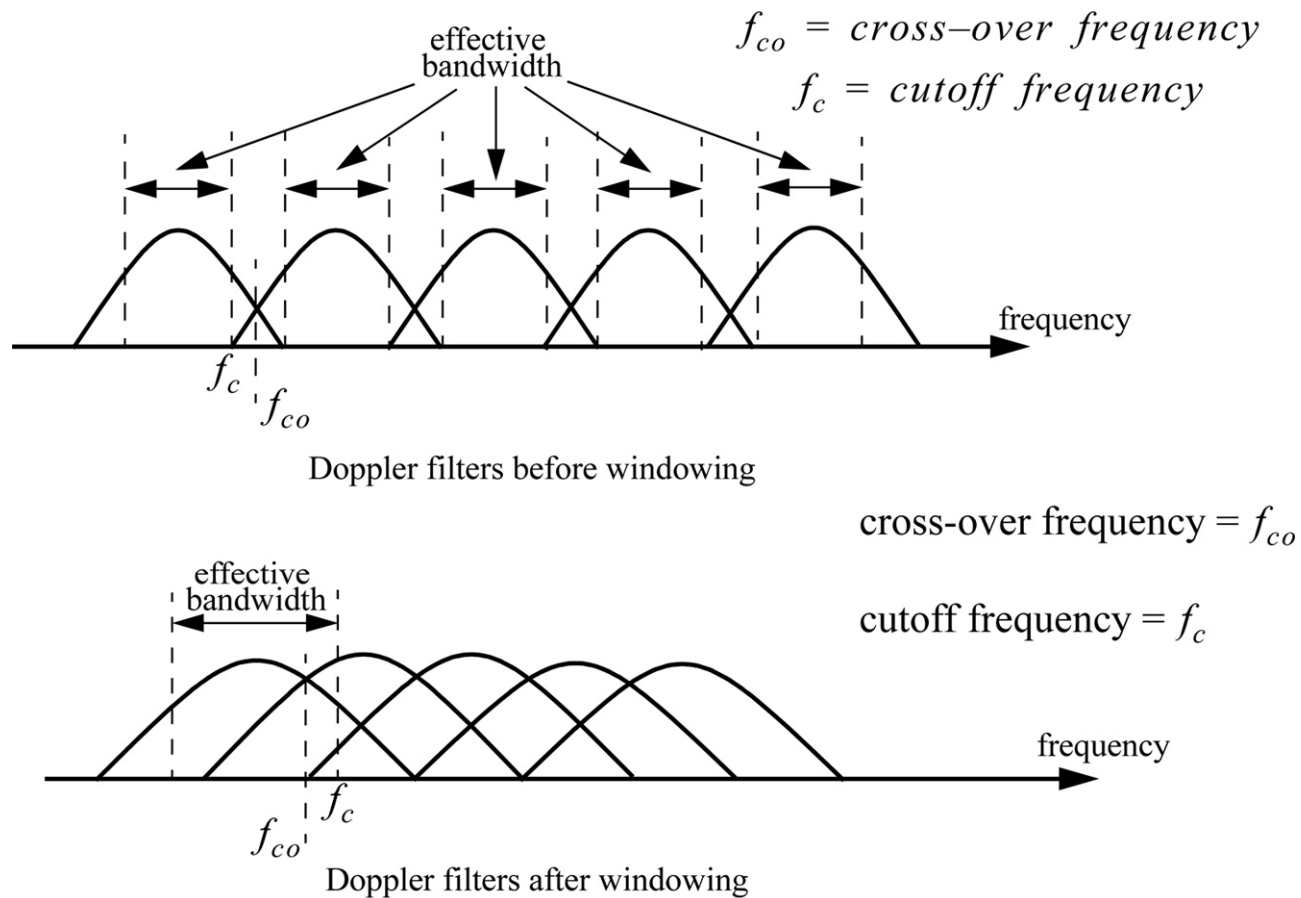


Figure 2.15. Due to windowing, the cross-over frequency may become smaller than the cutoff frequency.

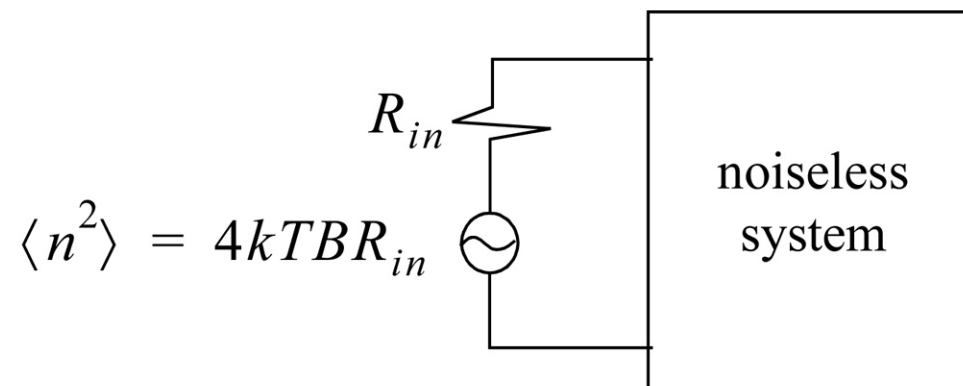


Figure 2.16. Noiseless system with an input noise voltage source.

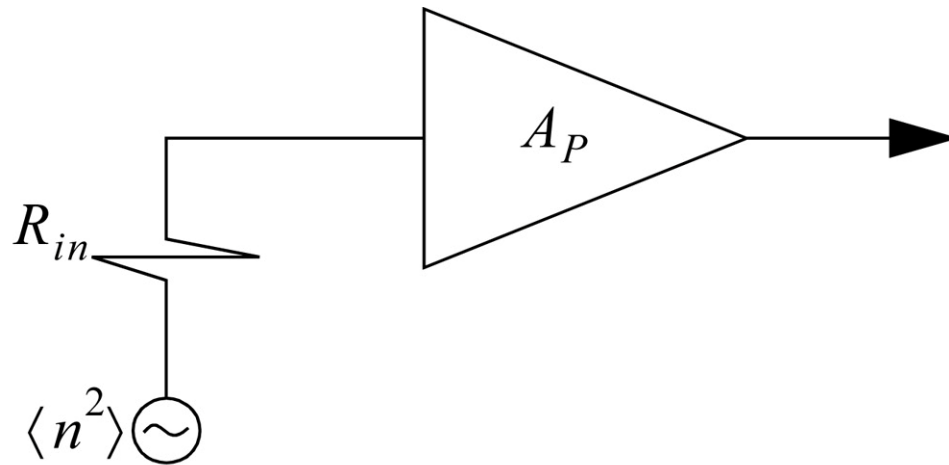


Figure 2.17. Noisy amplifier replaced by its noiseless equivalent and an input voltage source in series with a resistor.

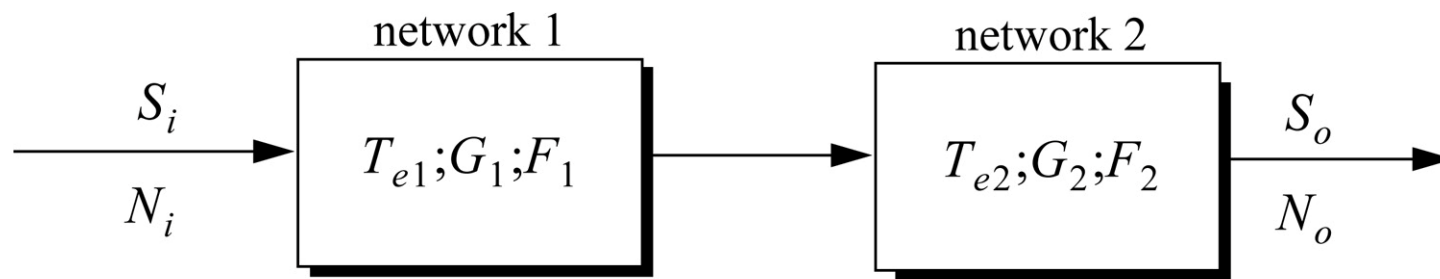


Figure 2.18. Cascaded linear system.

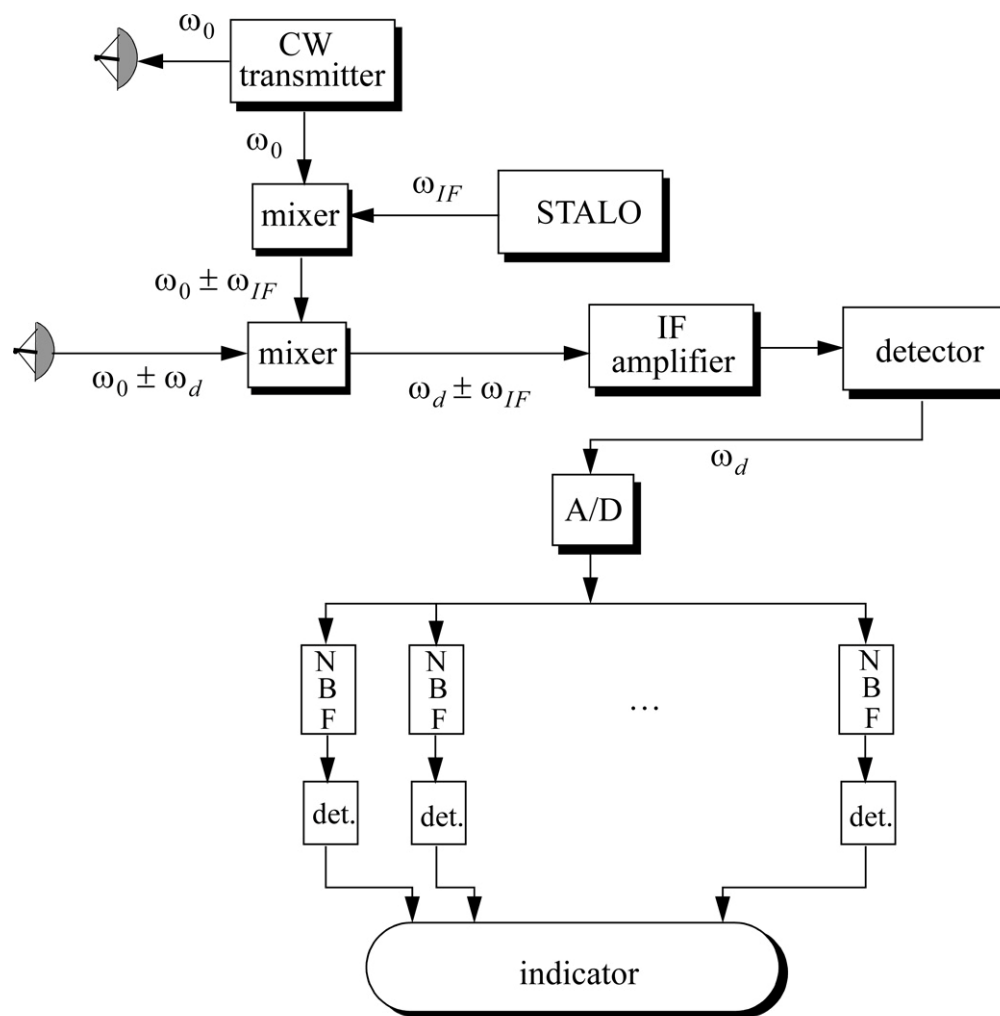


Figure 2.19. CW radar block diagram.

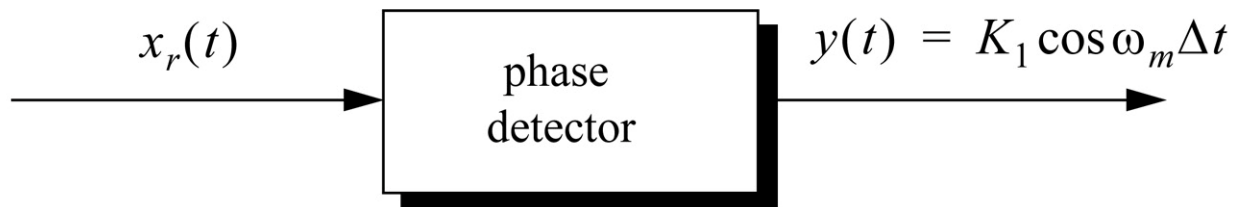


Figure 2.20. Extracting range from an FM signal return. K_1 is a constant.

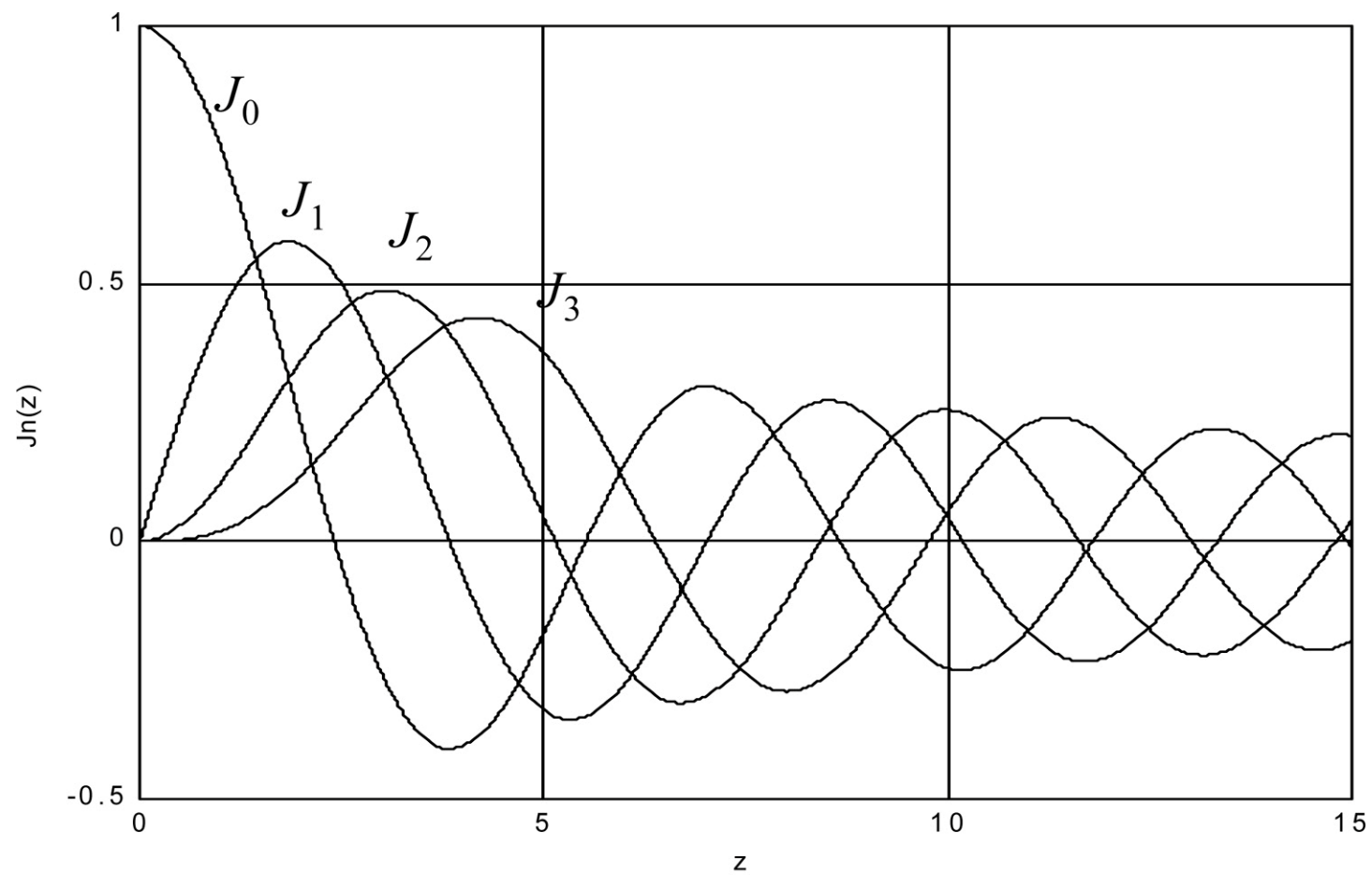


Figure 2.21. Plot of Bessel functions of order 0, 1, 2, and 3.

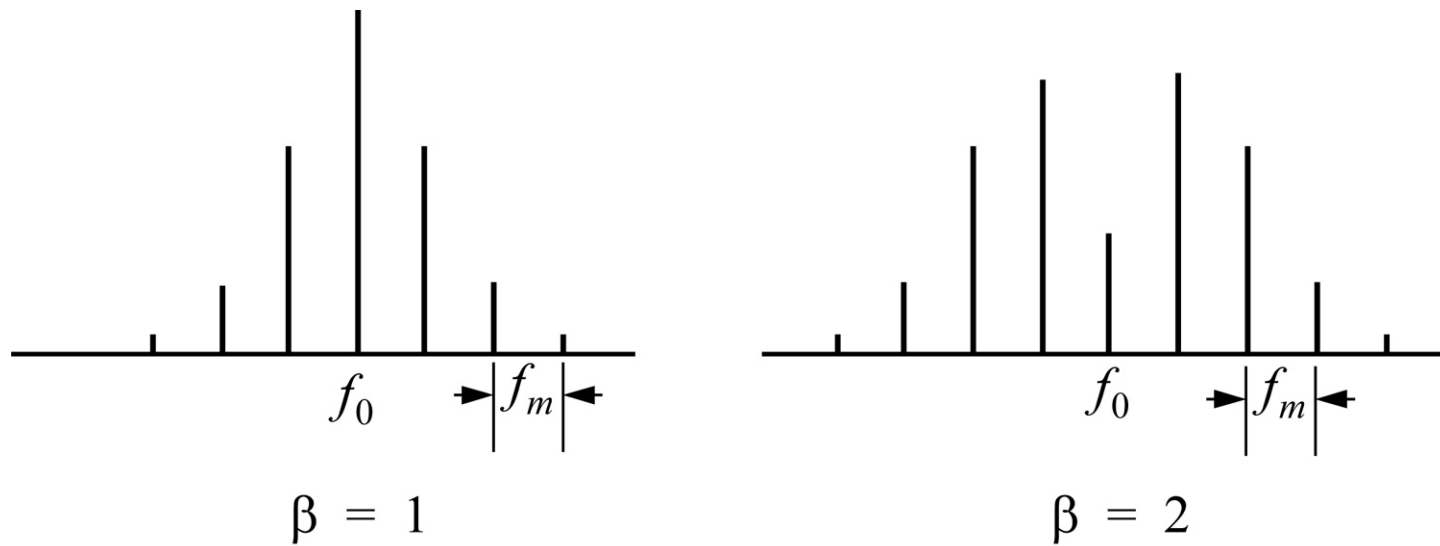
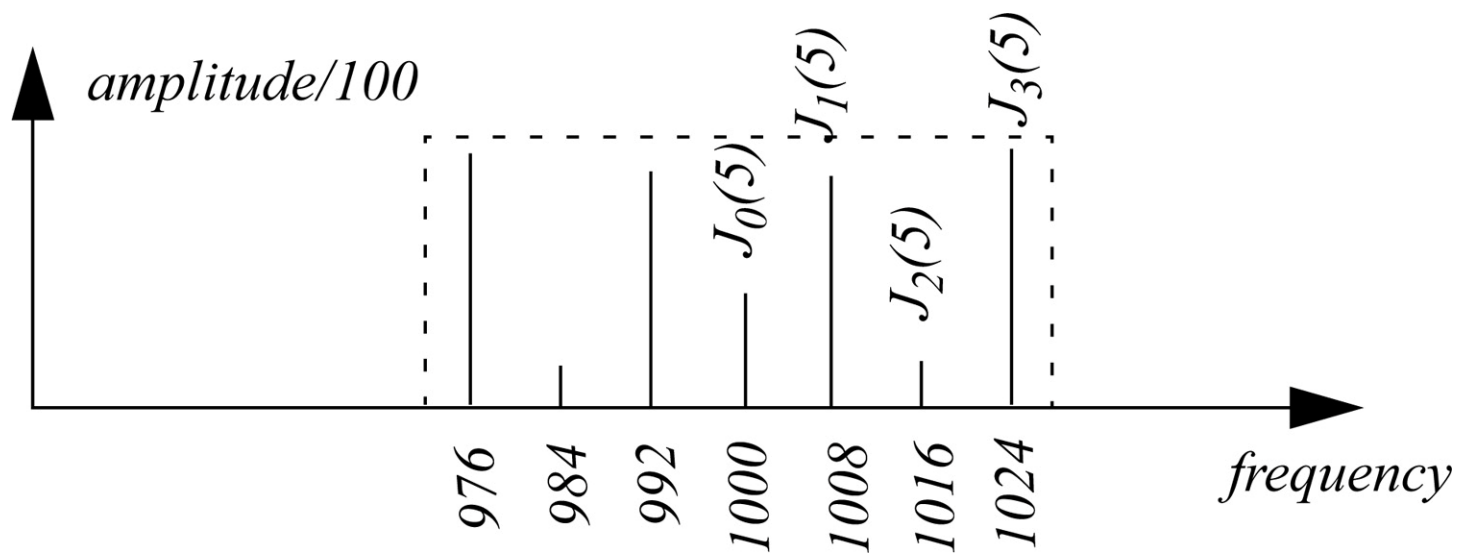


Figure 2.22. Amplitude line spectra sketch for FM signal.



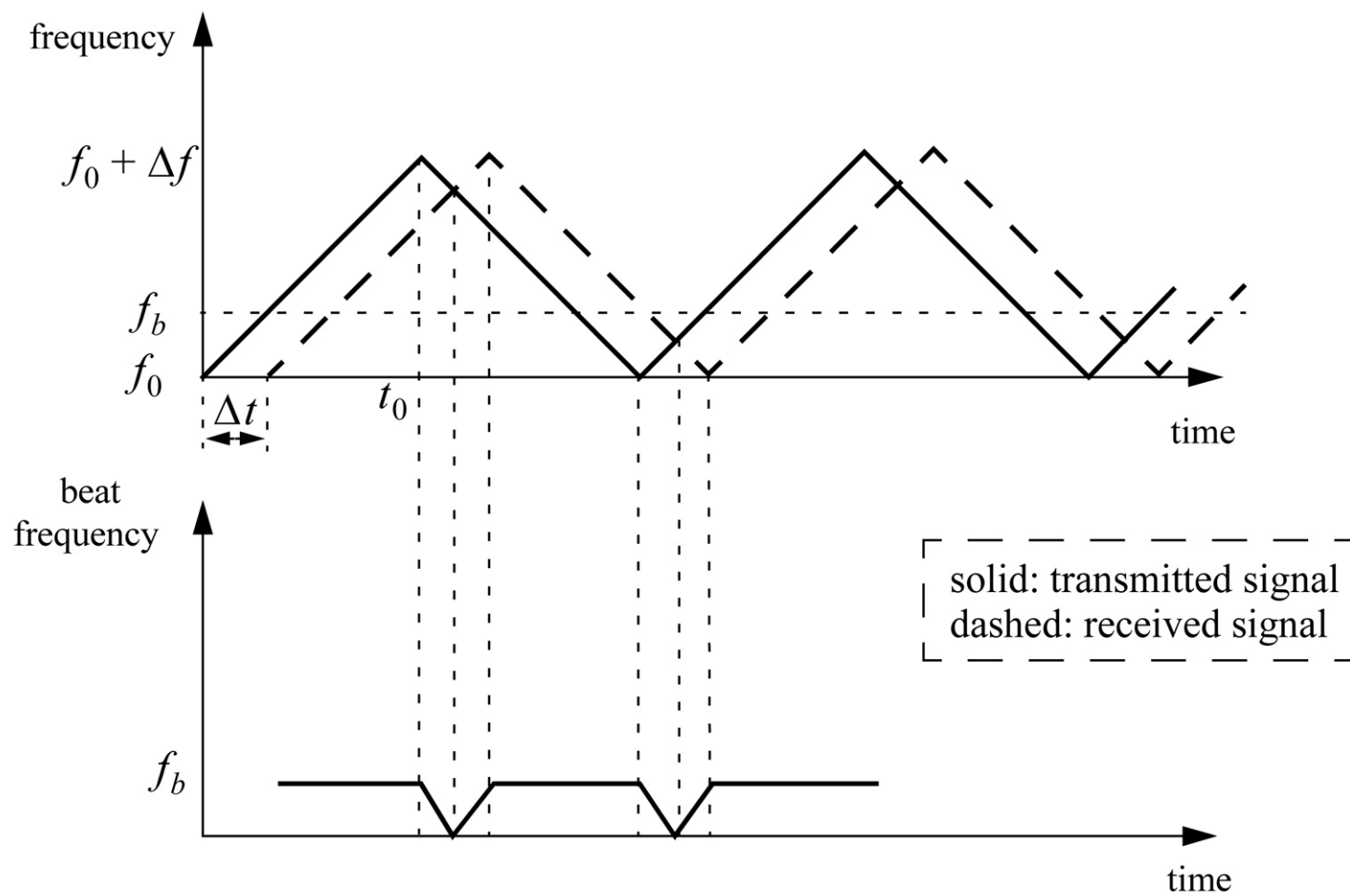


Figure 2.23. Transmitted and received triangular LFM signals and beat frequency for stationary target.

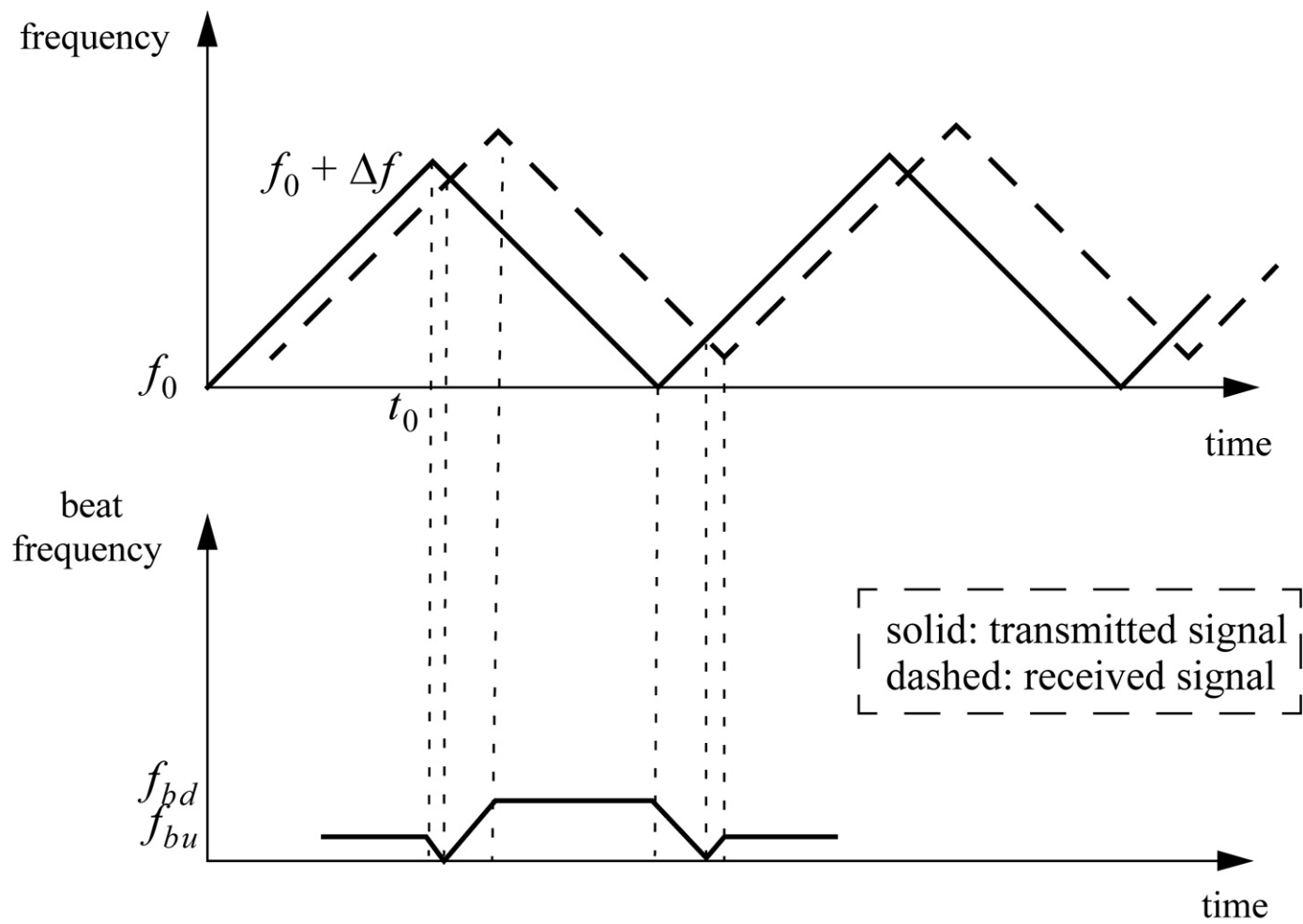


Figure 2.24. Transmitted and received LFM signals and beat frequency, for a moving target.

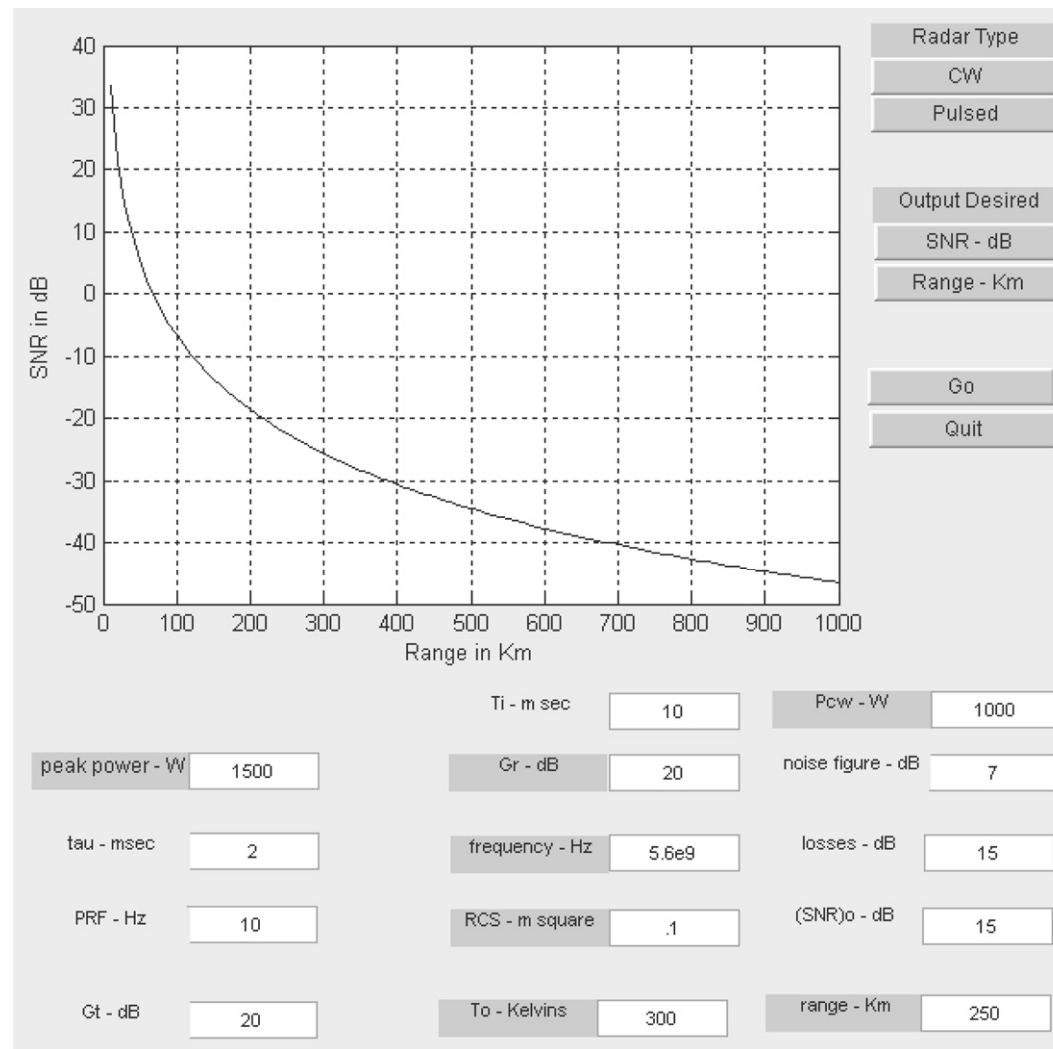


Figure 2.25. GUI work space associated with the program "*range_calc.m*."

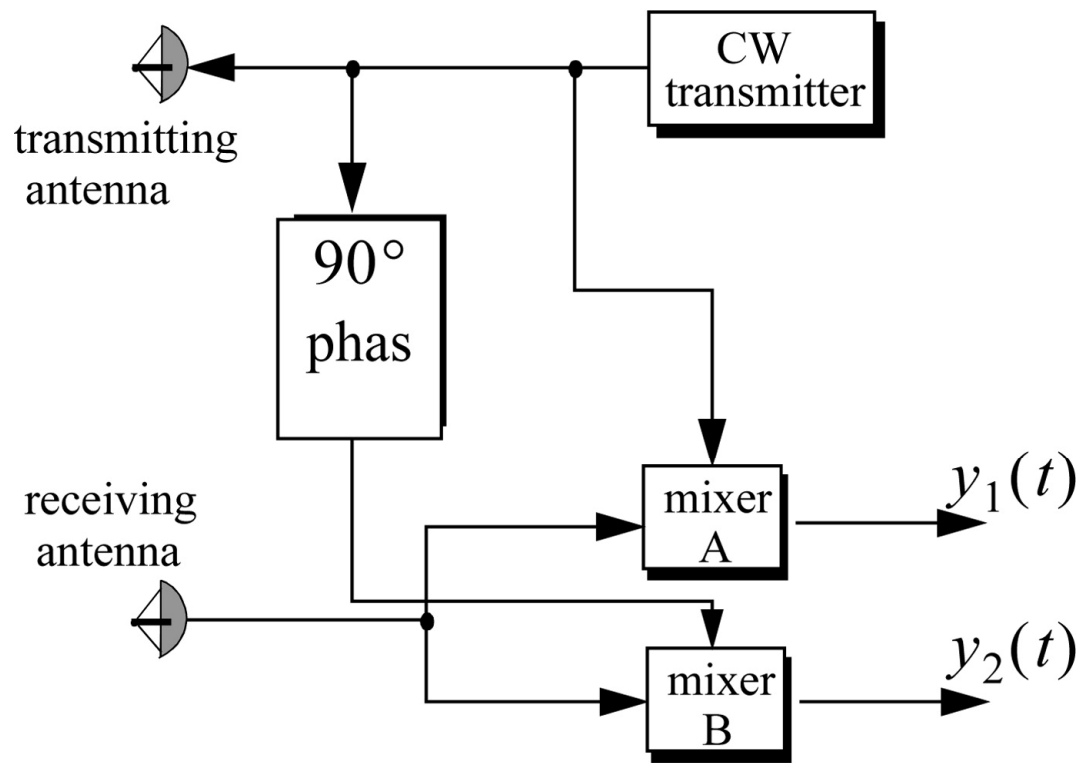


Figure P.2.34