The goal of this exercise is to compute the BER using some simple assumptions. Consider a binary digital communication at bitrate 50bps. The receiver is mobile and is moving toward the transmitter at speed 10m/s and the communication is over 1500MHZ frequency band.

1. What is the value of the frequency of Doppler shift?
2. Consider fadings (due to Doppler shift) of the received signal strength R below 0.1∗ρRMS. What is the average fade duration?
3. Assume that a bit is lost whenever the received signal strength R of any portion of the bit is below 0.1∗ρRMS. What would the BER of this communication?
4. fm = = = = 50Hz  
   Doppler Shift = 50Hz
5. Threshold Level (ρ) =   
   For ρ smaller than 0.1∗ρRMS, ρ =   
   Hence, ρ = 0.1

\mathrm{AFD} = \frac{e^{\rho^2} - 1}{\rho f_d \sqrt{2\pi}}.

Τ =   
 = 0.00080188731 s  
 = 0.8 ms

1. NT =\* fm \* ρ \* e-p\*p   
    = 2.5 \* 50 \* 0.1 \* 0.990049  
    = 12.375  
     
   Since a bit is lost whenever the received signal strength R of any portion of the bit is below 0.1∗ρRMS, Number of Bits lost is approximately equal to the number of times level crosses.  
   Thus, B.E.R = 12/50 = 0.24  
   Bit Error Rate = 0.24