Elliptical Modulation

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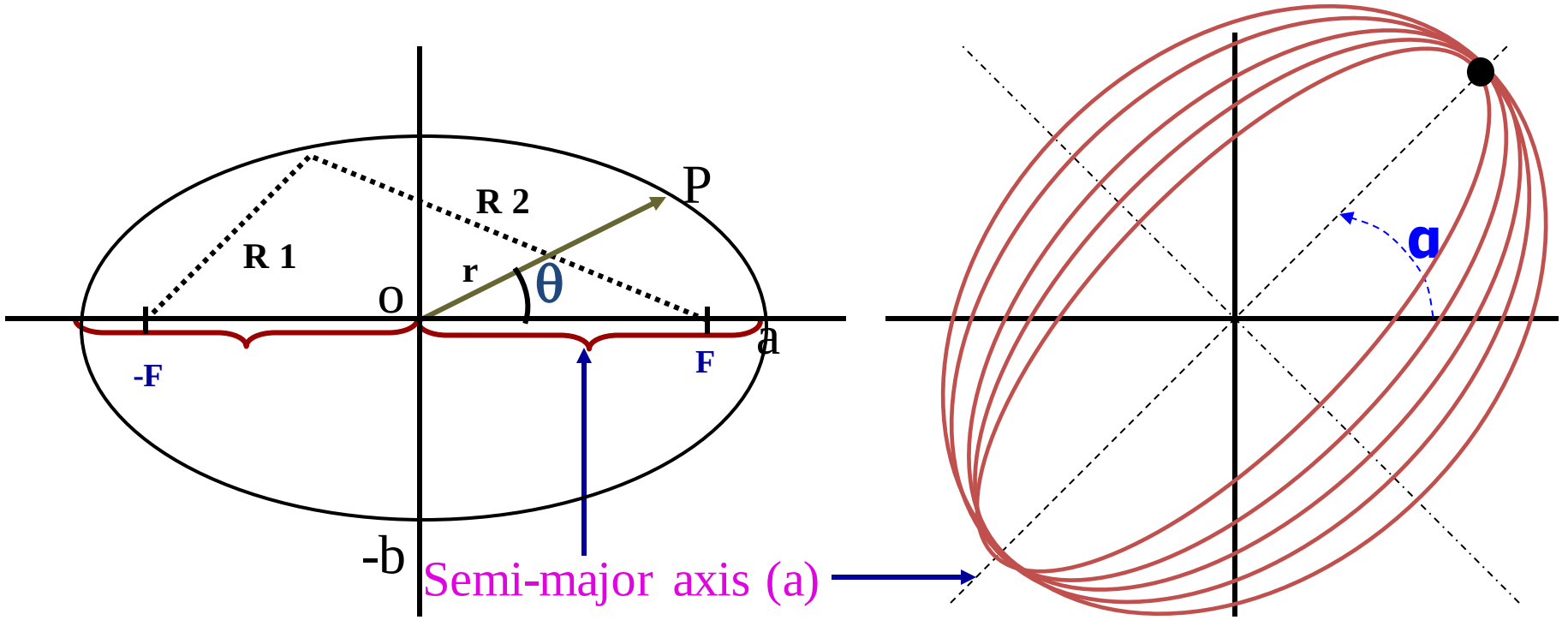
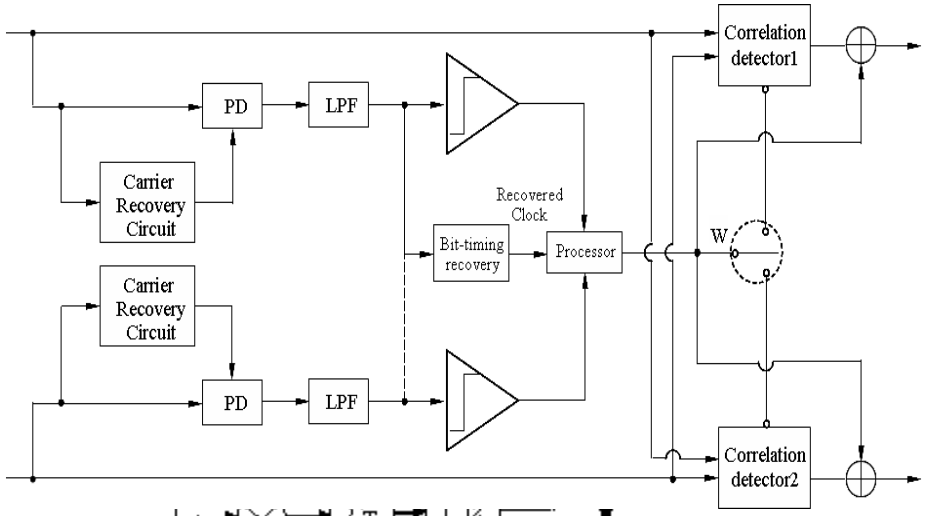


θ = **Revolution Angle** **α= Offset Inclination Angle**

ω_r = **the revolution frequency of the carrier**

e_c = **eccentricity**

Elliptical Phase Shift Keying (EPSK)

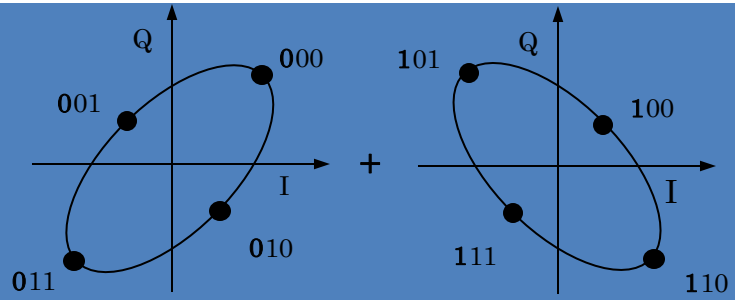


Reference signals1

$$\begin{cases} s_1(t) = a\sqrt{\dfrac{1-e_c^{\,2}}{1-e_c^{\,2}\cos^2 w_r t}}\cos(w_r t + \pi/4) \\ s_2(t) = a\sqrt{\dfrac{1-e_c^{\,2}}{1-e_c^{\,2}\sin^2 w_r t}}\cos(w_r t + \pi/4) \end{cases}$$

Reference signals2

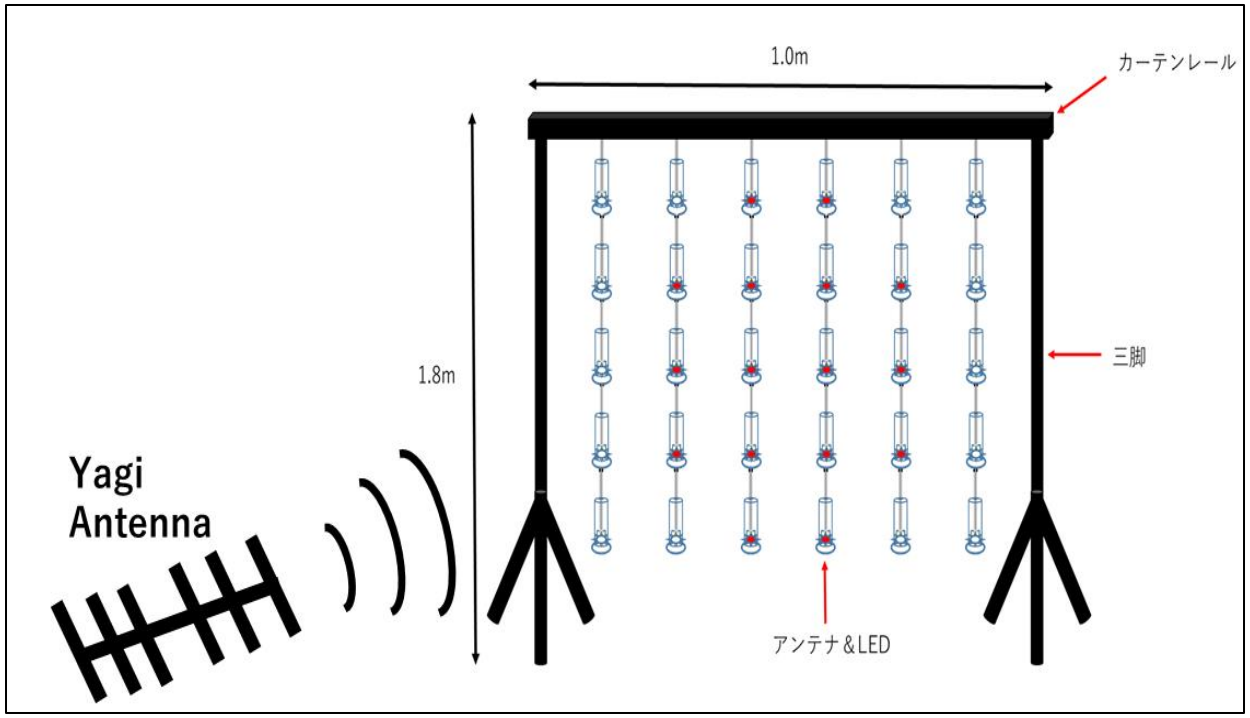
$$\begin{cases} s_3(t) = a\sqrt{\dfrac{1-e_c^{\,2}}{1-e_c^{\,2}\sin^2 w_r t}}\cos(w_r t + 3\pi/4) \\ s_4(t) = a\sqrt{\dfrac{1-e_c^{\,2}}{1-e_c^{\,2}\cos^2 w_r t}}\cos(w_r t + 3\pi/4) \end{cases}$$



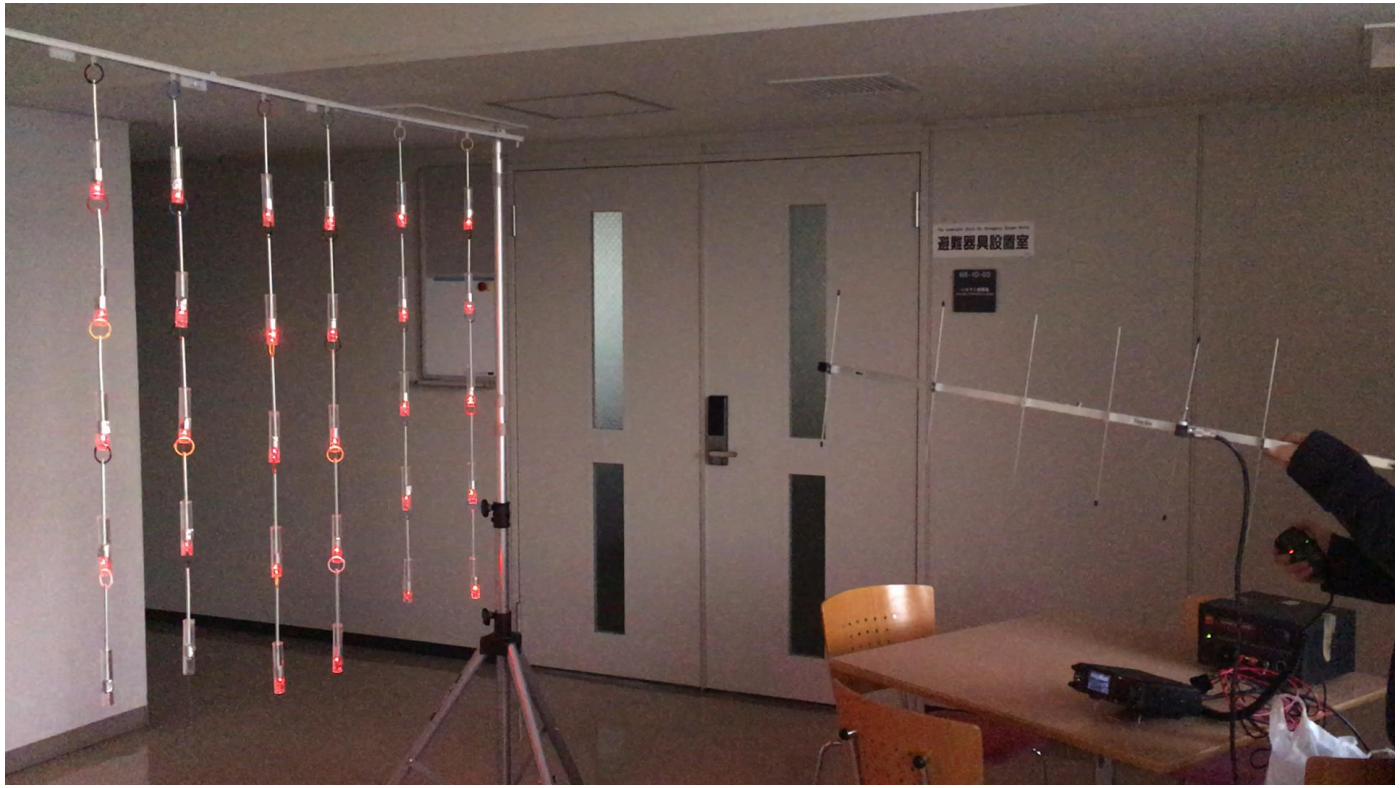
$$\cos(w_r t + \pi) = -\cos(w_r t) \Rightarrow \cos^2(w_r t + \pi) = \cos^2(w_r t)$$

$$\sin(w_r t + \pi) = -\sin(w_r t) \Rightarrow \sin^2(w_r t + \pi) = \sin^2(w_r t)$$

Visualize the Radio Signal

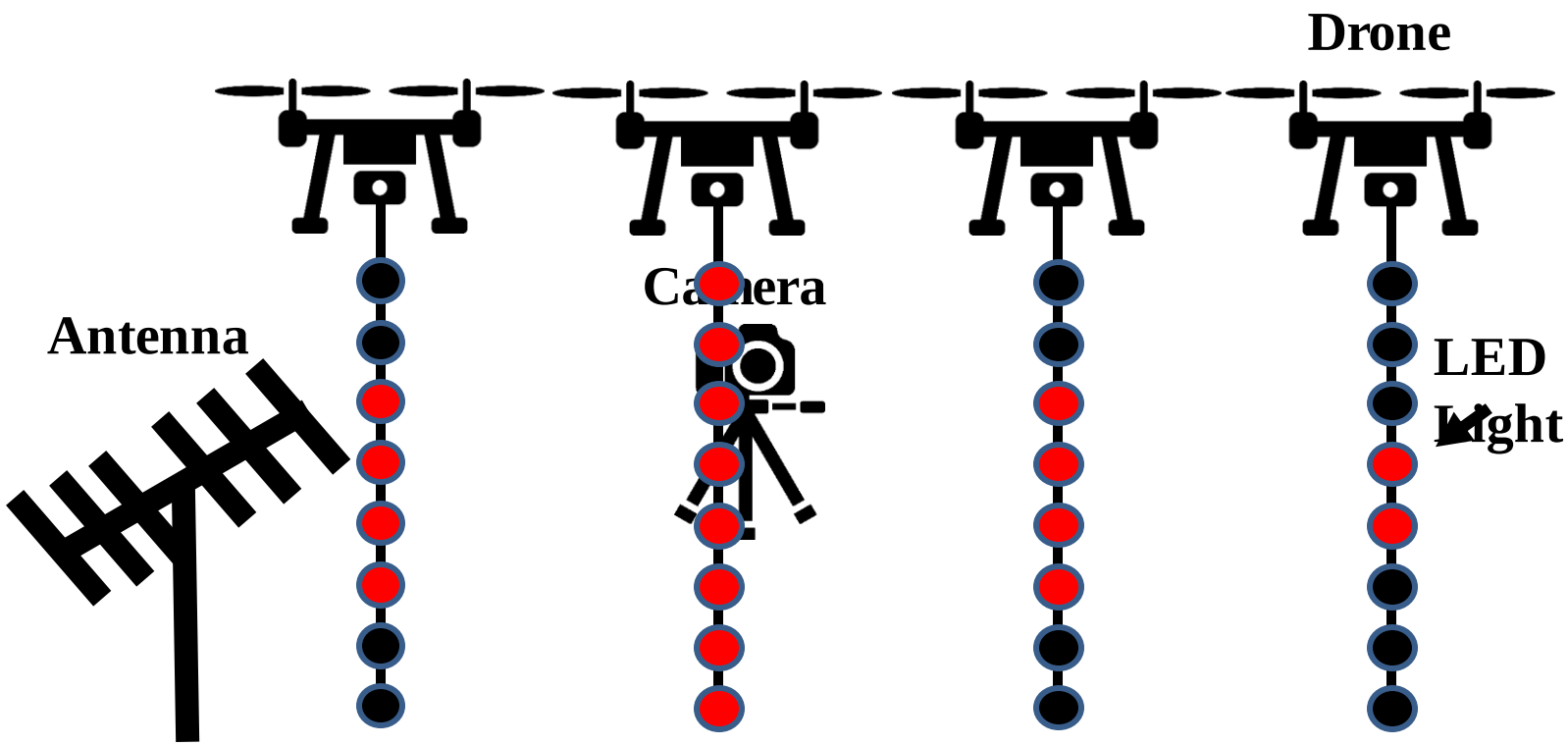


Durectivity

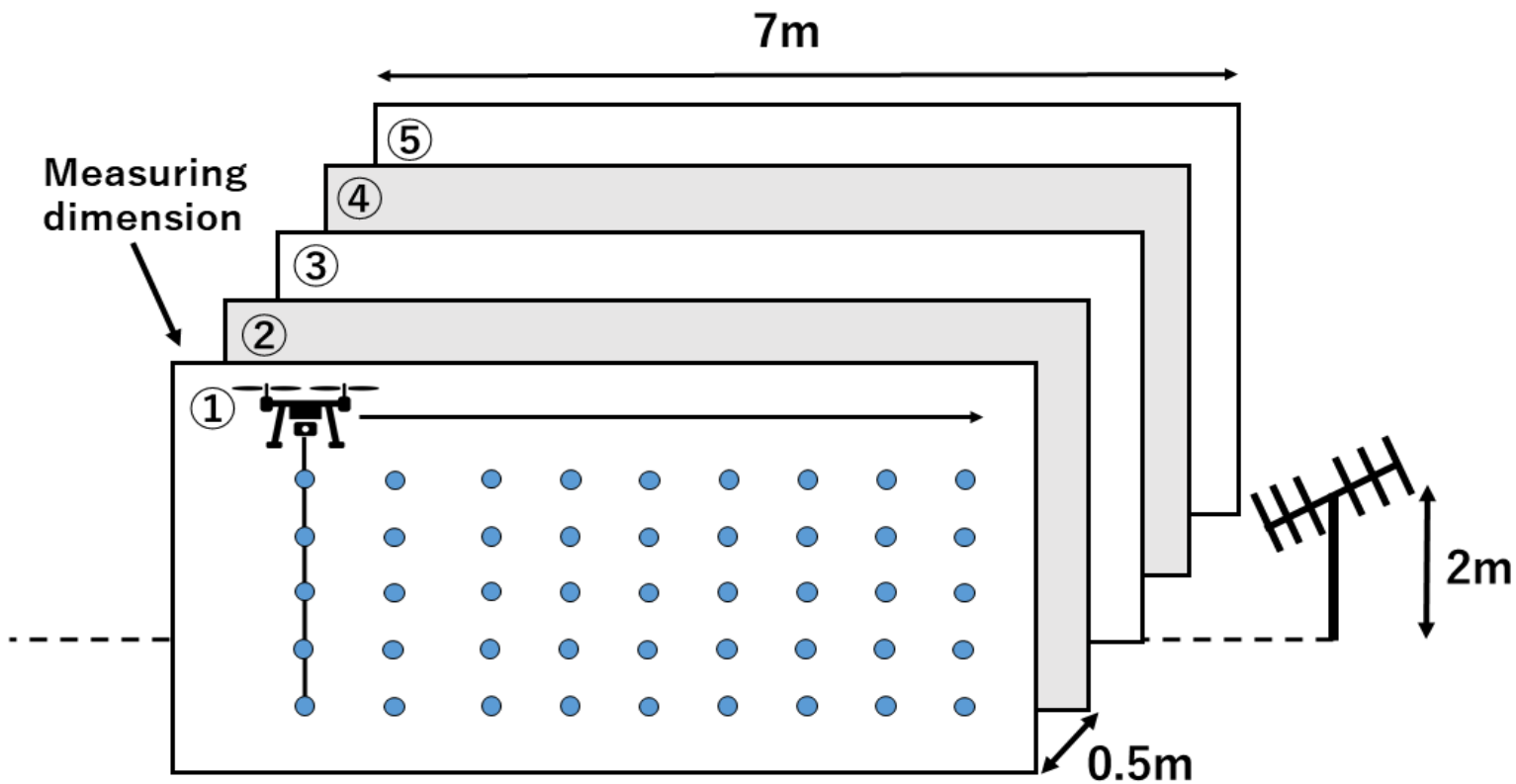


Polalization

Field Radio Scan with Drone



Experiment


7m
Measuring
dimension
⑤
④
③
②
①
2m
0.5m