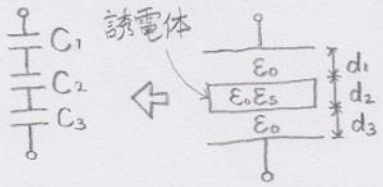
6. コンデンサの直列接続と並列接続

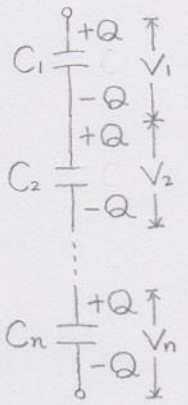


$$C_1=\frac{\varepsilon_0 S}{d_1} \quad C_2=\frac{\varepsilon_0\varepsilon_s S}{d_2} \quad C_3=\frac{\varepsilon_0 S}{d_3}$$

$$V=V_1+V_2+\cdots+V_n$$
$$=\frac{Q}{C_1}+\frac{Q}{C_2}+\cdots+\frac{Q}{C_n}$$

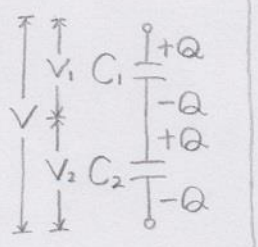
直列接続の合成静電容量C

$$\frac{1}{C}=\frac{V}{Q}=\frac{1}{C_1}+\frac{1}{C_2}+\cdots+\frac{1}{C_n}$$



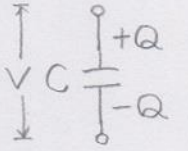
◦分担電圧

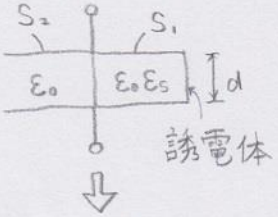
$$V_1=\frac{V_1}{V}\times V$$
$$=\frac{V_1}{V_1+V_2}V$$
$$=\frac{\frac{Q}{C_1}}{\frac{Q}{C_1}+\frac{Q}{C_2}}V$$
$$=\frac{\frac{1}{C_1}}{\frac{1}{C_1}+\frac{1}{C_2}}V=\frac{C_2}{C_1+C_2}V$$

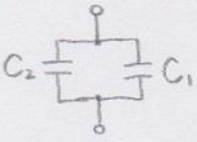


同様に

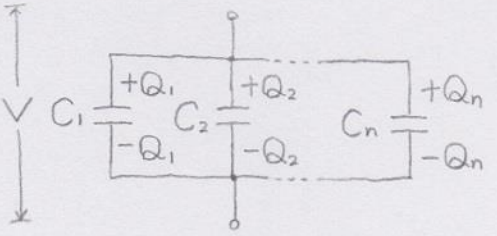
$$V_2=\frac{C_1}{C_1+C_2}V$$







$$C_1=\frac{\varepsilon_0\varepsilon_s S_1}{d}$$
$$C_2=\frac{\varepsilon_0 S_2}{d}$$



$$Q=Q_1+Q_2+\cdots+Q_n$$
$$=C_1V+C_2V+\cdots+C_nV$$

並列接続の合成静電容量C

$$C=\frac{Q}{V}=C_1+C_2+\cdots+C_n$$