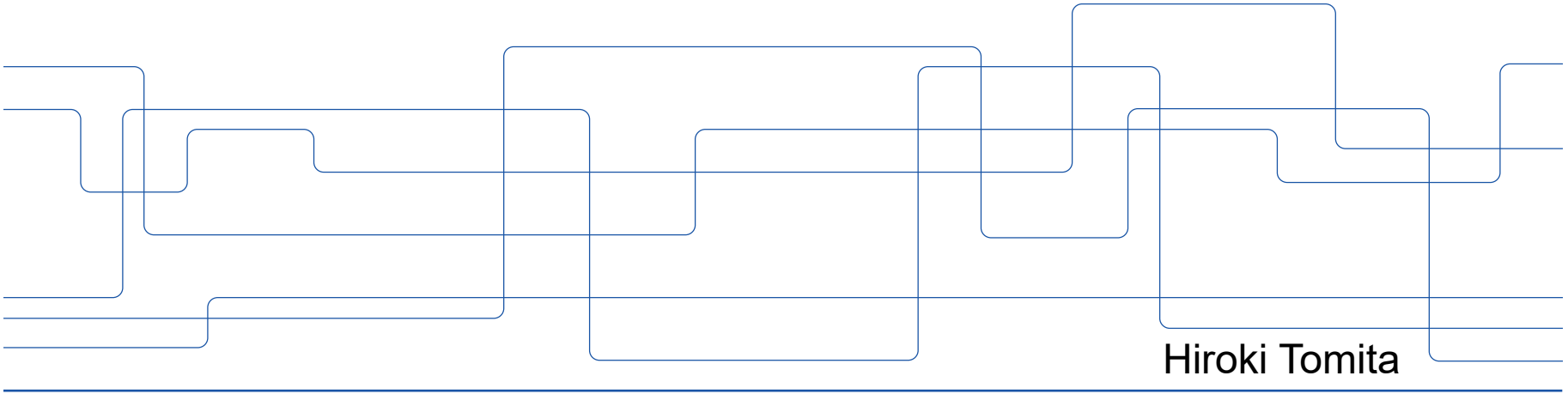
KTH ROYAL INSTITUTE
OF TECHNOLOGY

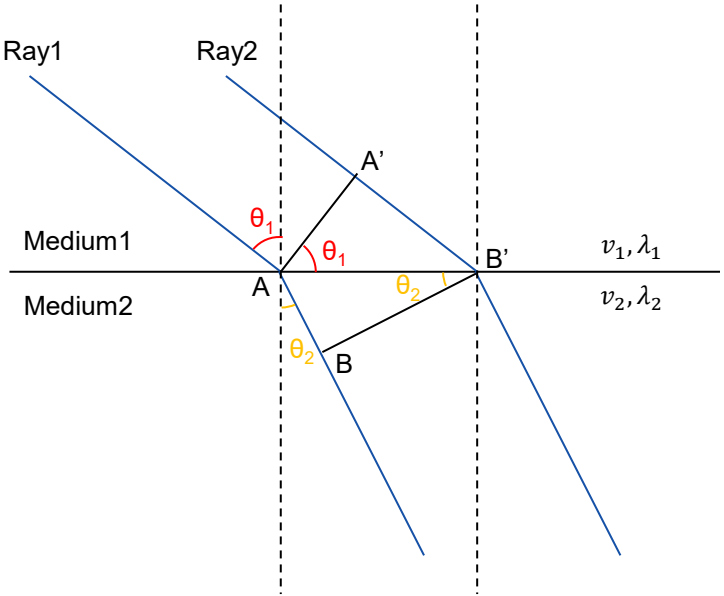
Wave Behaviours

Refractive index, Diffraction



Hiroki Tomita

Snell's law



Assume that ray1 goes from A to B and ray2 goes from A' to B' for 1 second

Then $\mathrm{A'B'} = v_1, \mathrm{AB} = v_2$

$$\sin\theta_1 = \frac{v_1}{\mathrm{AB'}}, \sin\theta_2 = \frac{v_2}{\mathrm{AB'}}$$

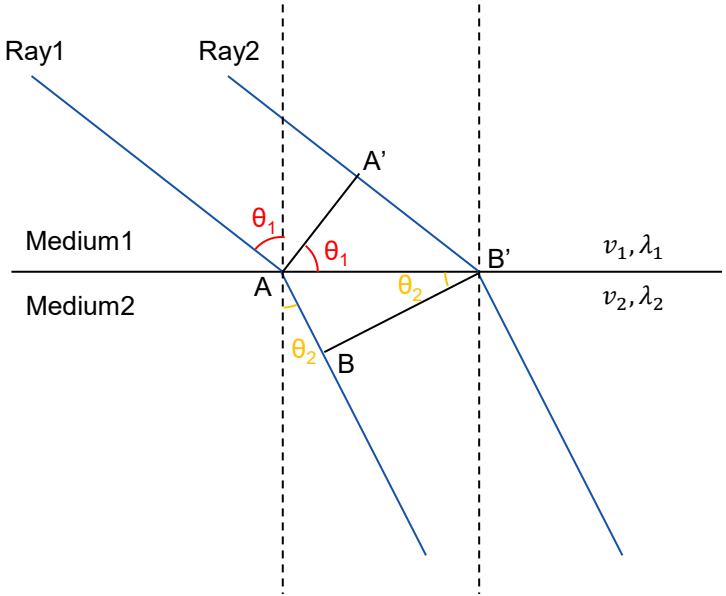
Thus $\frac{\sin\theta_1}{\sin\theta_2} = \frac{v_1}{v_2}$

Frequency is the same for medium1 and 2

$$v_1 = f\lambda_1, v_2 = f\lambda_2$$

$$\frac{\sin\theta_1}{\sin\theta_2} = \frac{v_1}{v_2} = \frac{\lambda_1}{\lambda_2}$$

Refractive index



- Definition of the refractive index n_m

The ratio of the speed of light in vacuum *c* to the speed of light in the medium v_m

$$n_m = \frac{c}{v_m}, \frac{\sin\theta_1}{\sin\theta_2} = \frac{n_2}{n_1}$$

$$\frac{\sin\theta_1}{\sin\theta_2} = \frac{v_1}{v_2} = \frac{\lambda_1}{\lambda_2} = \frac{n_2}{n_1}$$

Diffraction and interference

- Diffraction animation

https://sunege.github.io/wave/diffraction/diffraction.html#

- Interference animation

https://sunege.github.io/wave/2wave_line/2wave_line.html#