- **PE** : Positional Encoding Matrix
- **i** : Current Row
- **I** : Total Rows
- **j** : Current Column
- **J** : Total Columns
- $\boldsymbol{\delta}$: Current Hidden Dimension
- $\mathbf{d_m}$: Hidden Size of Model
- $\boldsymbol{\lambda}$: Odd/Even Check for Row/Col

$$\boldsymbol{PE}[\,\boldsymbol{\delta},\,\boldsymbol{i},\,\boldsymbol{j}\,] \in \mathbb{R}^{d_m \times I \times J}$$

$$= \begin{cases} \sin\left(i \cdot \mathrm{e}^{-\delta\left(\frac{\log(10000)}{d_m}\right)}\right) + \sin\left(j \cdot \mathrm{e}^{-\delta\left(\frac{\log(10000)}{d_m}\right)}\right) & \textbf{if } \lambda = [\,0,\,0\,] \\ \sin\left(i \cdot \mathrm{e}^{-\delta\left(\frac{\log(10000)}{d_m}\right)}\right) + \cos\left(j \cdot \mathrm{e}^{-\delta\left(\frac{\log(10000)}{d_m}\right)}\right) & \textbf{if } \lambda = [\,0,\,1\,] \\ \cos\left(i \cdot \mathrm{e}^{-\delta\left(\frac{\log(10000)}{d_m}\right)}\right) + \sin\left(j \cdot \mathrm{e}^{-\delta\left(\frac{\log(10000)}{d_m}\right)}\right) & \textbf{if } \lambda = [\,1,\,0\,] \\ \cos\left(i \cdot \mathrm{e}^{-\delta\left(\frac{\log(10000)}{d_m}\right)}\right) + \cos\left(j \cdot \mathrm{e}^{-\delta\left(\frac{\log(10000)}{d_m}\right)}\right) & \textbf{if } \lambda = [\,1,\,1\,] \end{cases}$$

Where $\boldsymbol{\lambda} = [\,i,\,j\,] \,\%\, 2$