Waves and Music

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Waves properties and music: A wave is a disturbance that keeps moving up and down, or left and right in a systematic way just like when we drop a stone in water. We use Python programming to study wave properties like wavelength (**λ**), frequency (**ν**), amplitude (**A**), velocity (**V**) and attenuation factor (**f**) and check how these wave properties control musical sounds on a flute or a piano.

***Figure 1**: Waves on water surface (AI generated)*

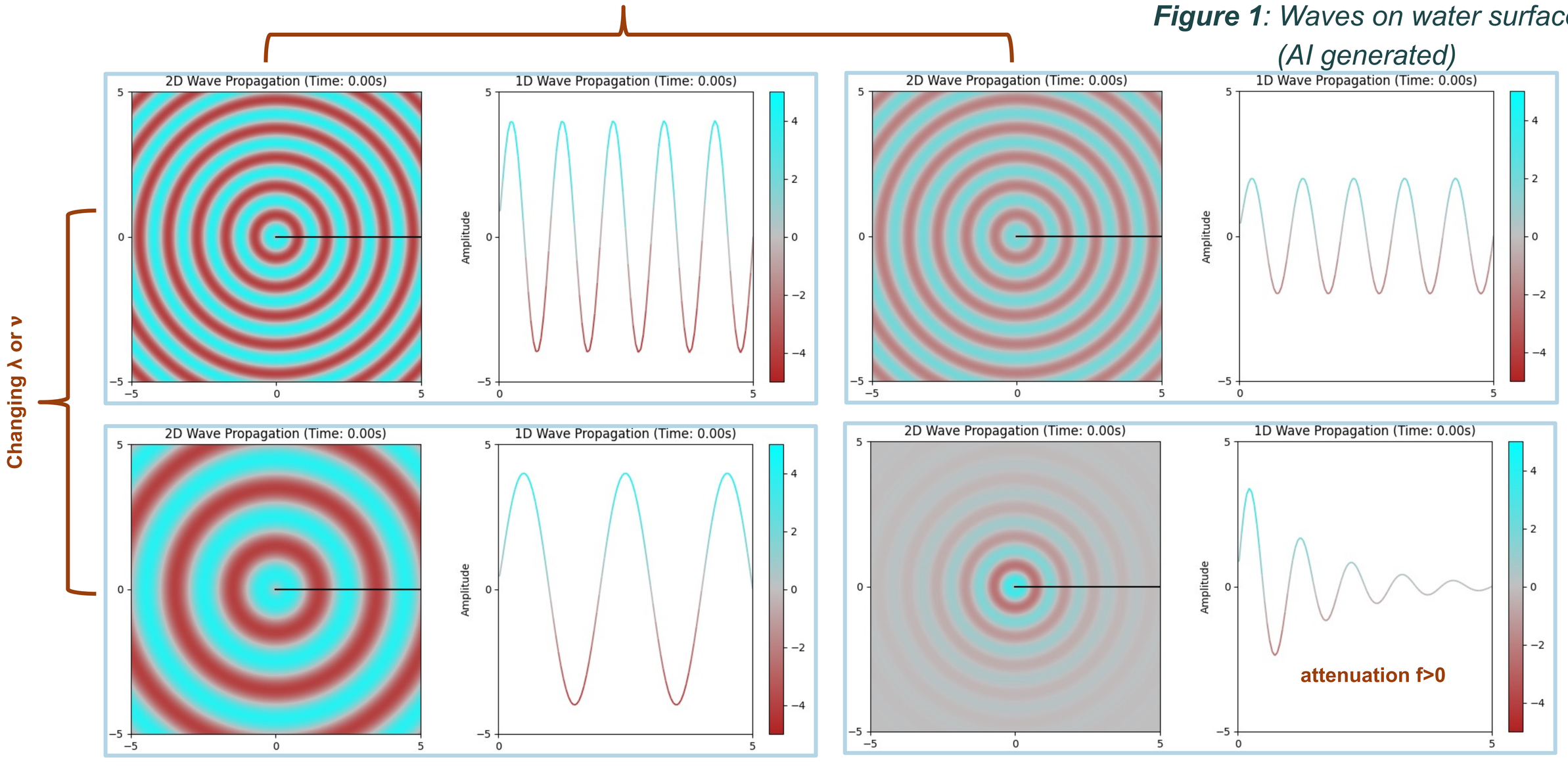

***Figure 2**: Changing wave properties – **λ/ν, A,** and **f** while keeping **V** fixed.*

***Figure 3:** Wave property **λ** decreases and **ν** increases as we move from the note C3 to a higher note F#3 on a flute/piano. **A** controls volume, **V** doesn't change for sound in air, **f** is higher for piano than harmonium.*

Methods: We used Python libraries and Google Gemini AI to create functions to plot waves and play Indian Carnatic music songs based on musical notes.

```
def create2D1DWaves( wavePropertiesAsParameters )
        ...
return
```

```
def playMusicFromNotes( musicalNotesAsParameters )
        ...
return
```

Scientific Method: (order not strictly followed)

Question? Wave properties and musical sounds

Experiment and Data Collection? Modeling with python

Hypothesis? Changing wave properties (***λ, ν , f*** *and* ***A)*** change musical sounds

Testing? Flute, piano, python

Conclusion? ***ν/λ*** change musical notes, ***A*** changes volume, ***f*** is higher for piano and lower for harmonium.

References:

1.PyCharm
https://www.jetbrains.com/pycharm/

2. Google Gemini AI
https://gemini.google.com/

3. OpenStax Physics
https://openstax.org/details/books/physics