

# Project – Caudal Fin

Sinusoidal animation

# MyFish – Caudal Fin animation

The initial version of the caudal fin's animation was a constant animation, using a sinusoidal function similar to:

$$\text{caudalFinAngle} = y(t) = A * \sin(t)$$

**A** is the amplitude, which changes the deviation from zero, **e.g.**, `Math.PI/4` (so that it varies between -45 and 45 degrees)

# MyFish – Caudal Fin animation with speed

Now we want to use the speed of **MyFish**, so that the caudal fin moves faster or slower, accordingly.

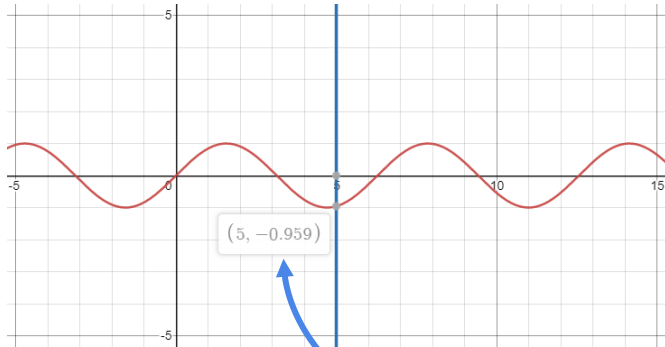
The calculations for *caudalFinAngle* must be changed to adapt to speed changes.

**What would happen if we simply applied the *speed* in the previous function?**

# Speed as multiplier in sinusoidal function

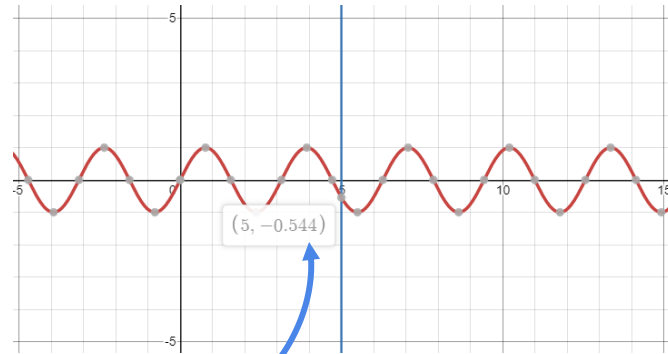
Adding the speed as a multiplier (**angular frequency**) in the sinusoidal function **does not result in the expected effect**: it may produce “jumps” in the animation.

$$\text{caudalFinAngle} = A * \sin(t * \text{mult})$$



$$f(x) = \sin(x)$$

For the same X value, we are at different “phases” of the wave



$$f(x) = \sin(2x)$$

# MyFish – Variable caudal fin animation

The current angle for the caudal fin animation must be calculated similarly to the moving object's position, in its **update()** function:

- 1 Calculate time passed between frames (**deltaTime**)
- 2 Calculate caudal fin's **speed** (dependent on the speed of MyFish)
- 3 Calculate **deltaAngle** – the amount to increment (or decrement) to the *caudalFinAngle* variable, following the function:

$$\text{deltaAngle} = \text{finSpeed} * \text{deltaTime}$$

Considering the  
speed function:

$$v = \frac{dx}{dt}$$

# MyFish – Update function

A look at the adapted ***update()*** function:

```
update(t, speed){  
    deltaTime = ... //Calculate time between frames  
    finSpeed = initialSpeed + speed ... //Adjust speed with multipliers/offsets  
    deltaAngle = finSpeed * deltaTime;  
    ...  
    this.caudalFinAngle += deltaAngle ... //Increment or decrement, how?  
    ...  
}
```

# Additional remarks

The caudal fin's **speed** should not be zero when speed of ***MyFish*** is zero  
Change the **direction** of the rotation by incrementing or decrementing the ***deltaAngle***

- Use a minimum/maximum angle threshold to change the direction
- Suggestion: use a variable to indicate direction of rotation