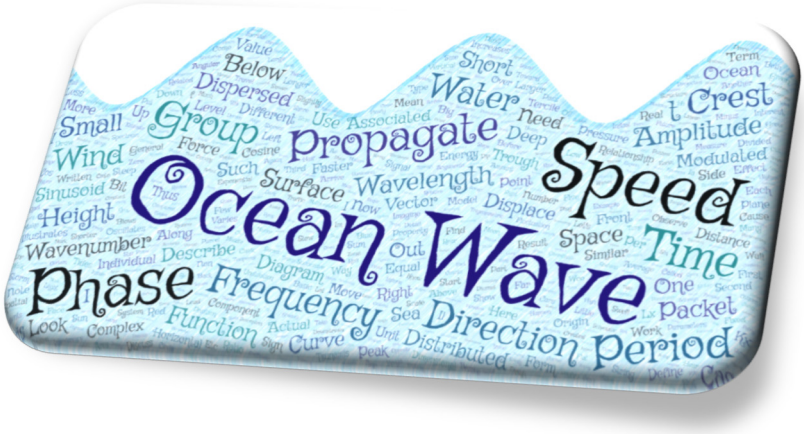
Nom et Prénoms :_____

Note: /10

M1-SOAC TR1

Chapter 1: General Properties of the Waves
Wave Kinematics



Barème

One of the simplest possible evolution partial differential equation that is not either hyperbolic or parabolic is the **Airy Equation**, which Initial Value Problem (IVP) can be written as ($x \in \mathbb{R}$):

$$\begin{cases} \dfrac{\partial u}{\partial t} + \dfrac{\partial^3 u}{\partial x^3} = 0 \\ u(0,x) = u_0(x) \end{cases}$$

➥ Let's look for a 1D wave solution (exponential notation) of parameters A, k, ω and ϕ.

/1 **1)** What are the names and physical representation of these parameters?

/3 **2)** Substitute this solution into the partial differential wave equation to obtain a relationship $\omega = f(k)$ for the Airy waves.

/1 **3)** What is the name of this relation?

/2 **4)** Plot the relation into a diagram ω as a function of k.

/1 **5)** What is the name of this diagram?

/1 **6)** Are the long waves faster or slower than the short waves (justify graphically)?

/1 **7)** Is this wave dispersive or non-dispersive?