**P**

**t=t**

**ωt**

**t=0**

**A**

**ϕ**

 x>0

**x**

**Φ=0**

ϕ>0

**t**

**Φ>0**

**t=0**

**P**

**t=t**

**A**

**ωt**

**ϕ**

**t=0**

x>0

**x**

**Φ<0**

**Φ=0**

ϕ<0

**t**

**t=0**

To find the phase constant we should use initial condition for both the position and the velocity of the element of the medium.

Now consider a wave described by the following equation:

**v**

**An element in the string**

**y**

**u0**

**y0**

**x=0**

**x**

At t=0, we got

We use the above two equation at t=0 and the direction of u0 to solve for φ.

Note that, if the wave direction is to left (-x direction), the direction of u0 will be toward the +y direction.

Note also that ym, k and w are positive quantities.