Exercise – 08 (total = 40')

Due date: Apr. 26, 2022, 23:59

Part – 1: Please refer to Lecture 8 to answer the following questions (5' x 6 = 30')

(1) What is the basic principle for constructing the equation on page 9 and that on page 12?

(2) On page 17, when we discuss the initial condition, we only mention the initial displacement and the initial velocity. Why don't we care about the initial acceleration?

(3) On page 17, it is mentioned that "differential equation only applies to the interior of the considered region". Do you know why?

(4) What is the basic principle for deriving the boundary condition on page 20? Why can we drop out the term related to acceleration?

(5) In deriving the boundary condition on page 21, why is there a negative sign ahead of $k[u(l,t) - u_0]$?

(6) In deriving the boundary condition on page 24, why is there a negative sign ahead of $k\frac{\partial u}{\partial n}$? (Hint: you can assume that the boundary temperature $u|_\Sigma$ is higher than the ambient temperature u_0, and then make your judgement.)

Part – 2: Drawing (10')

Apply the knowledge of traveling wave to figure out ***the region of influence*** and ***the domain of dependence*** for the "blue bar". For reference, the two red lines represent the leftward- and rightward-propagating waves along which information can be transmitted.