# 工程數學 (四) - 偏微分方程作業六

8:20-10:10, Apr. 9, 1998

**1.** Solve the PDE

$$u_{tt} = u_{xx}, \quad for \quad -\infty < x < \infty, \ \ t > 0$$

with initial conditions

$$u(x,0) = 0, \ \dot{u}(x,0) = \frac{1}{a}[H(x-a) - H(x+a)]$$

where $H(t)$ is Heaviside function.
(1). As $a = 1$, check the same problem of homework.
(2). Discuss the limiting case for $a \to 0$.
(3). Plot the 3-D plot of $u(x,t)$.
(4). Plot the contour of $u(x,t)$ in $x - t$ plane.

**2.** Solve the PDE

$$u_{tt} = u_{xx}, \quad for \quad -\infty < x < \infty, \ \ t > 0$$

with initial conditions

$$u(x,0) = \frac{1}{a}[H(x-a) - H(x+a)], \ \dot{u}(x,0) = 0$$

where $H(t)$ is Heaviside function.
(1). As $a = 1$, check the same problem of homework.
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Fig.1