

HW 8

①:

8.1 PULSE ON STRETCHED STRING

μ = LINEAR MASS DENSITY = 0.1 Kg/m

T = TENSION = 40 N

$$C = \sqrt{\frac{T}{\mu}} = 20 \text{ m/s}$$

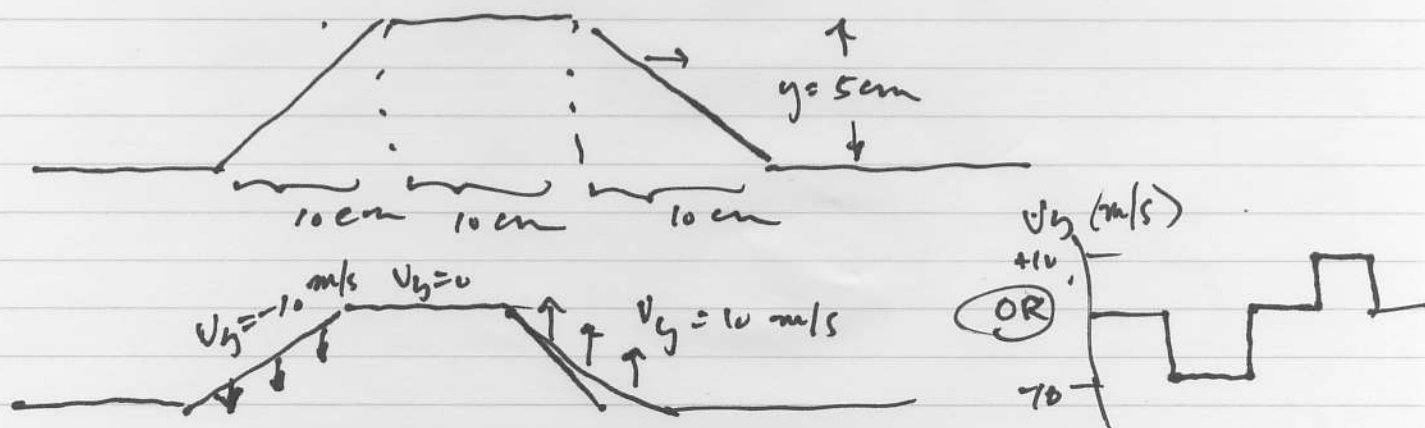
RECIPE FOR PULSE GENERATION

V_y time $y \text{ (AFTER)} = V_y \lambda t$

$+10 \text{ m/s}$	5 ms	5 cm
0	5 ms	5 cm
-10 m/s	5 ms	0 cm

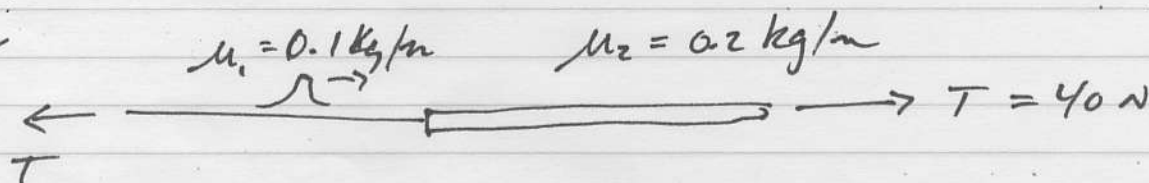
THE PULSE MOVES AT 20 m/s SO THE LEADING EDGE HAS MOVED $20 \text{ m/s} \times 5 \text{ ms} = 10 \text{ cm}$ BY THE TIME IT IS GENERATED (SAME FOR OTHER TWO PARTS).

DRAWING NOT TO SCALE:



3

8.2



$$c_1 = \sqrt{\frac{T}{\mu_1}} = \sqrt{\frac{40 \text{ N}}{0.1 \text{ kg/m}}} = 20 \text{ m/s}$$

$$c_2 = \sqrt{\frac{40 \text{ N}}{0.2 \text{ kg/m}}} = 14.14 \text{ m/s} \quad * \text{ PULSE BECOMES NARROWER IN DENSER MEDIUM}$$

$$Z_1 = \sqrt{\mu_1 T_1} = 2 \text{ kg/s}$$

$$Z_2 = \sqrt{\mu_2 T_2} = 2.83 \text{ kg/s}$$

FROM NOTES AND CLASS WE FOUND

$$C_R = \frac{Z_1 - Z_2}{Z_1 + Z_2}$$

$$C_T = \frac{2Z_1}{Z_1 + Z_2}$$

plugging in above values

$$C_R = \frac{2 - 2.83}{2 + 2.83} = -0.17$$

AMPLITUDE OF REFLECTED PULSE IS -0.17 mm
PULSE WIDTH = 1 cm

$$C_T = \frac{2(2)}{2 + 2.83} = 0.83$$

AMPLITUDE OF TRANSMITTED PULSE IS 0.83 mm

WIDTH OF PULSE IS $1 \text{ cm} \cdot \frac{14.14 \text{ m/s}}{20 \text{ m/s}} = 0.71 \text{ cm}$

Check: $1 + C_R = 0.83 = C_T$ [OK]

MORNING
AFTER
DIAGRAM:

