Problem 2.2

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a. Diagram 1:

$m_0 = 0$, $\tilde{S}_0 = 0$
$m_1 = \varepsilon$, $\tilde{S}_1 = \varepsilon$
$m_2 = \varepsilon$, $\tilde{S}_2 = -\varepsilon$
$m_4 = 2\varepsilon$, $\tilde{S}_4 = 0$

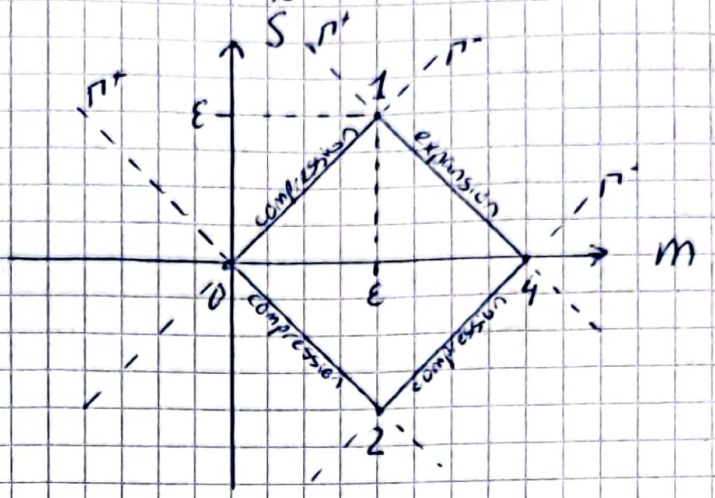


Diagram 2:

$m_1 = \varepsilon$, $\tilde{S}_1 = \varepsilon$
$m_3 = 0$, $\tilde{S}_3 = 0$
$m_4 = 2\varepsilon$, $\tilde{S}_4 = 0$
$m_6 = \varepsilon$, $\tilde{S}_6 = -\varepsilon$

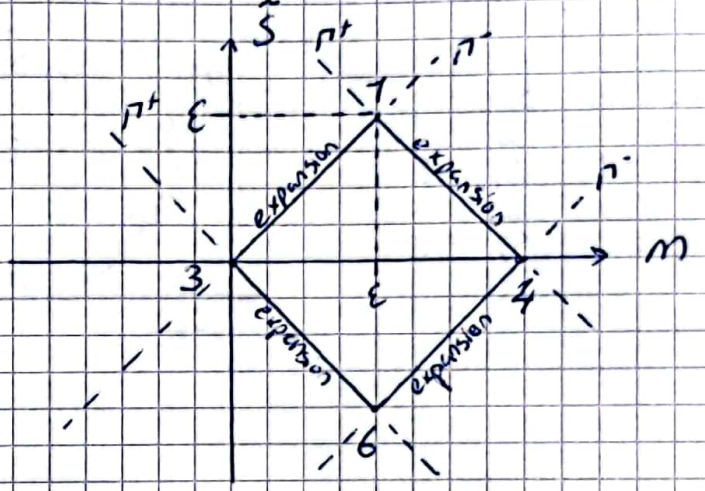


Diagram 3:

$m_2 = \varepsilon$, $\tilde{S}_2 = -\varepsilon$
$m_4 = 2\varepsilon$, $\tilde{S}_4 = 0$
$m_5 = 0$, $\tilde{S}_5 = 0$
$m_7 = \varepsilon$, $\tilde{S}_7 = \varepsilon$

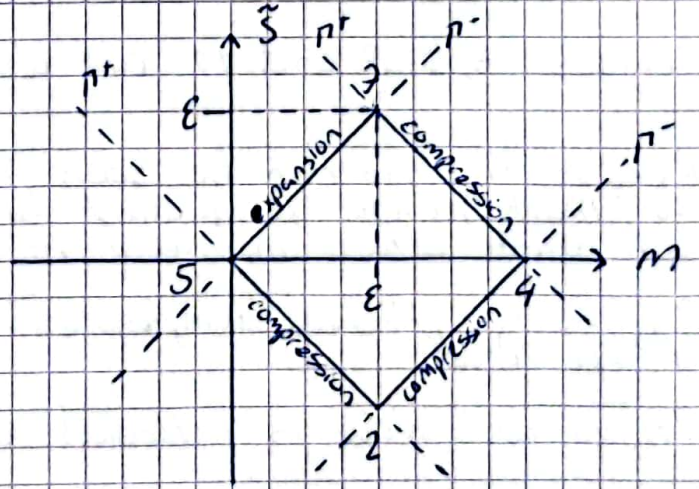


Diagram 4:

$m_6 = \varepsilon$, $\tilde{s}_6 = -\varepsilon$

$m_7 = \varepsilon$, $\tilde{s}_7 = \varepsilon$

$m_8 = 0$, $\tilde{s}_8 = 0$

$m_9 = 2\varepsilon$, $\tilde{s}_9 = 0$

$m_{10} = -\varepsilon$, $\tilde{s}_{10} = \varepsilon$

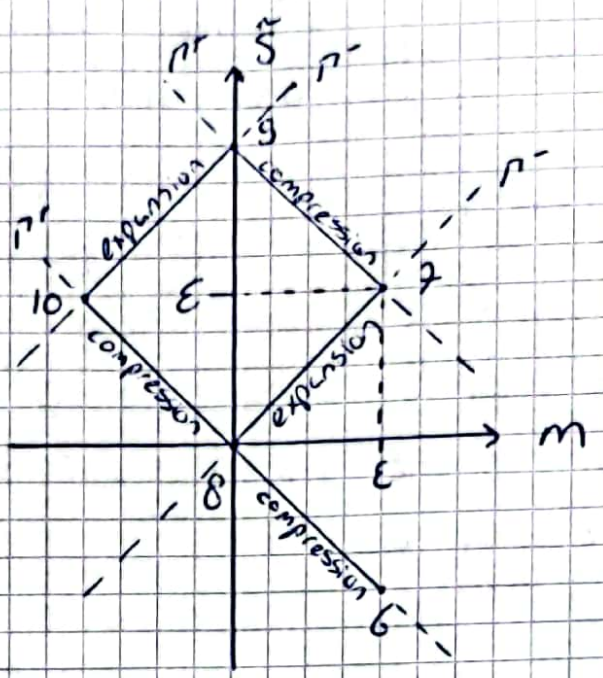
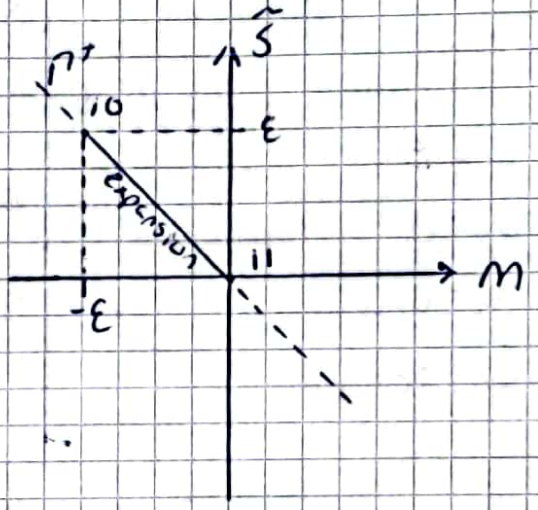


Diagram 5:

$m_{10} = -\varepsilon$, $\tilde{s}_{10} = \varepsilon$

$m_{11} = 0$, $\tilde{s}_{11} = 0$



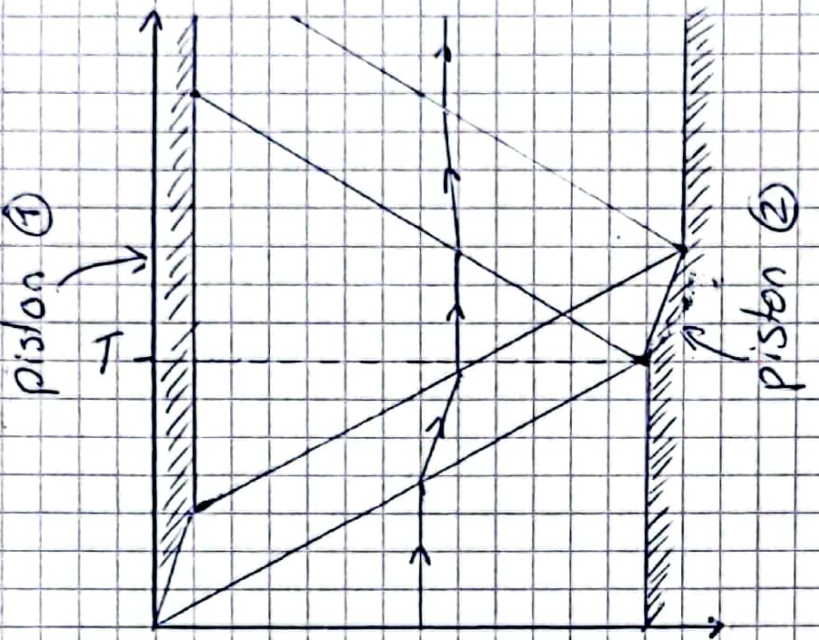
b. Regions 3, 5, 8 and 11 are also unpuctured

c. Region 4. As can be seen in the diagrams above the Mach number is highest here. Both pistons complement each others movement in region 4.

d. Region 9. Highest compression. because of reflection of the wall

e. Region 10. Wave is reflected of wall

f.



Activating piston ② when the wave from piston ① reaches it. The number of waves are minimized