宋体, 六号

正激波

定常,绝热,无黏,无体积力,但不等熵。控制方程为 $\Delta(\rho u) = \Delta(p + \rho u^2) = \Delta(h + \rho u^2)$ $\left(\frac{u^2}{2}\right) = 0$, $\# M_2^2 = \frac{(\gamma-1)M_1^2+2}{2\gamma M_1^2-(\gamma-1)}$ $\# R-H \times X \stackrel{\rho_2}{=} \frac{\rho_2}{\rho_1} = \frac{(\gamma+1)M_1^2}{(\gamma-1)M_1^2+2}$

 $rac{T_2}{T_1} = (2\gamma M_1^2 - \gamma + 1) rac{(\gamma - 1) M_1^2 + 2}{(1 + \gamma)^2 M_1^2}$, $rac{p_2}{p_1} = 1 + rac{2\gamma}{\gamma + 1} (M_1^2 - 1)$ 。正激波过后,熵增 $s_2 - s_1 =$ $c_p ln \Big\{ \Big[1 + \frac{2\gamma}{\gamma+1} (M_1^2 - 1) \Big] \frac{2 + (\gamma - 1) M_1^2}{(\gamma + 1) M_1^2} \Big\} - R ln \Big[1 + \frac{2\gamma}{\gamma+1} (M_1^2 - 1) \Big] \, . \ \, 若来流马赫数小于 1,熵减,$

由热力学第二定律,不存在这种情况。总压关系 $\frac{P0.2}{P0.1} = e^{-(s_2-s_1)/R} < 1$ 。普朗特关系 $a^{*2} =$ $\mathbf{u}_1\mathbf{u}_2$ 。亚声速可压缩流中速度的测量,考虑绝热等熵,应用等熵关系式 \mathbf{M}_1^2 = $\frac{2}{\gamma-1} \left[\left(\frac{p_{0,1}}{p_1} \right)^{(\gamma-1)/\gamma} - 1 \right]$ 。超声速可压缩流中速度的测量,考虑绝热不等熵,有正激波,

宋体, 小六

正激波

定常,绝热,无黏,无体积力,但不等熵。控制方程为 $\Delta(\rho u)=\Delta(p+\rho u^2)=\Delta\left(h+\frac{u^2}{2}\right)=0$,得 $M_2^2 = \frac{(y-1)M_1^2+2}{2yM_1^2-(y-1)}$ 。有 R-H 关系式 $\frac{\rho_2}{\rho_1} = \frac{(y+1)M_1^2}{(y-1)M_1^2+2}$, $\frac{T_2}{T_1} = \left(2\gamma M_1^2 - \gamma + 1\right) \frac{(y-1)M_1^2+2}{(1+\gamma)^2M_1^2}$, $\frac{p_2}{p_1} = 1 + \frac{2\gamma}{\gamma+1} \left(M_1^2 - 1\right)$ 正激波过后,熵增 $s_2-s_1=c_p \ln\left\{\left[1+\frac{2\gamma}{\gamma+1}\left(M_1^2-1\right)\right]\frac{2+(\gamma-1)M_1^2}{(\gamma+1)M_1^2}\right\}-R\ln\left[1+\frac{2\gamma}{\gamma+1}\left(M_1^2-1\right)\right]$ 。若来流马赫数 小于 1,熵减,由热力学第二定律,不存在这种情况。总压关系 $\frac{P02}{p_0} = e^{-(s_2-s_1)/R} < 1$ 。普朗特关系 α^{*2} u_1u_2 。亚声速可压缩流中速度的测量,考虑绝热等熵,应用等熵关系式 $M_1^2=rac{2}{r-1}\Big[\Big(rac{p_{01}}{p_0}\Big)^{(\gamma-1)/\gamma}-1\Big]$ 。 声速可压缩流中速度的测量,考虑绝热不等熵,有正激波, $\frac{p_{02}}{p_1} = \left(\frac{(y+1)^2 M_1^2}{4yM_1^2-2(y-1)}\right)^{y/(y-1)} \frac{1-y+2yM_1^2}{y+1}$

定常,绝热,无黏,无体积力,但不等熵。控制方程为 $\Delta(pu) = \Delta(p + \rho u^2) = \Delta(h + \frac{u^2}{2}) = 0$, 得 $M_2^2 = \frac{(v-1)M_1^2 + 2}{2vM_1^2 - (\gamma-1)}$ 。有 R-H 正激波 关系式 $\frac{p_2}{\rho_1} = \frac{(\gamma+1)M_1^2}{(\gamma-1)M_1^2+2}, \ \frac{T_2}{T_1} = \left(2\gamma M_1^2 - \gamma + 1\right) \frac{(\gamma-1)M_1^2+2}{(1+\gamma)^2M_1^2}, \ \frac{p_2}{\rho_1} = 1 + \frac{2\gamma}{\gamma+1} \left(M_1^2 - 1\right)$ 。正激波过后,熵增 $s_2 - s_1 = c_p ln\{[1+\gamma], [1+\gamma], [1+\gamma]$ $\frac{2\gamma}{\gamma+1}(M_1^2-1)\Big]\frac{2+(\gamma-1)M_1^2}{(\gamma+1)M_1^2}\Big\} - Rln\Big[1+\frac{2\gamma}{\gamma+1}(M_1^2-1)\Big]$ 。若来流马赫数小于 1,熵减,由热力学第二定律,不存在这种情况。 关系 $\frac{n_0}{n_0}=e^{-(s_2-s_1)/R}<1$ 。普朗特关系 $a^{*2}=u_1u_2$ 。亚声速可压缩流中速度的测量,考虑绝热等熵,应用等熵关系式 M_1^2 $\frac{2}{v-1} \left[\left(\frac{\rho_U}{n_1} \right)^{(\gamma-1)/\gamma} - 1 \right]$ 。超声速可压缩流中速度的测量,考虑绝热不等熵,有正激波, $\frac{\rho_U}{n_1} = \left(\frac{(\gamma+1)^2 M_1^2}{4M^2 - 2(\gamma-1)} \right)^{\gamma/(\gamma-1)} \frac{1 - \gamma + 2/M_1^2}{\gamma + 1}$

定常,绝热,无黏,无体积力,但不等熵。控制方程为 $\Delta(\rho u) = \Delta(p + \rho u^2) = \Delta\left(h + \frac{u^2}{2}\right) = 0$, 得 $M_2^2 = \frac{(\gamma - 1)M_1^2 + 2}{2\rho M_1^2 - (\gamma - 1)}$ 。 有 R-H 关系式 $\frac{\rho c}{\rho t} = \frac{1}{2}$ $\frac{(y+1)M_1^2}{(y-1)M_1^2+2}, \ \, \frac{\tau_2}{\tau_1} = \left(2\gamma M_1^2 - \gamma + 1\right) \frac{(y-1)M_1^2+2}{(1+\gamma)^2 h_1^2}, \ \, \frac{\rho_2}{\rho_1} = 1 + \frac{2\gamma}{\gamma+1} \left(M_1^2 - 1\right) \text{.} \ \text{正藏該过后,} \ \, 嬌增 \\ s_2 - s_1 = c_p \ln \left\{ \left[1 + \frac{2\gamma}{\gamma+1} \left(M_1^2 - 1\right)\right] \frac{2+(y-1)M_1^2}{(y+1)M_1^2} \right\} - \text{Rln} \left[1 + \frac{2\gamma}{\gamma+1} \left(M_1^2 - 1\right)\right] \frac{2+(y-1)M_1^2}{(y+1)M_1^2} + \frac{2\gamma}{\gamma+1} \left(M_1^2 - 1\right) \frac{2+(y-1)M_1^2}{(y+1)M_1^2} + \frac{2\gamma}$ $\frac{3}{4} \left(M_1^2 - 1 \right)$]。若来流马赫数小于 1,熵减,由热力学第二定律,不存在这种情况。总压关系 $\frac{n_2}{n_1} = e^{-(s_2 \cdot s_1)/R} < 1$ 。普朗特关系 $a^2 = \frac{1}{4}$ $\mathbf{u}_1\mathbf{u}_2$ 。亚声速可压缩流中速度的测量,考虑绝热等熵,应用等熵关系式 $\mathbf{M}_1^2 = \frac{2}{\gamma-1} \left[\left(\frac{\mathbf{u}_1}{\mathbf{p}_1} \right)^{(\gamma-1)/\gamma} - 1 \right]$ 。超声速可压缩流中速度的测量, 虑绝热不等熵,有正激波, $\frac{P_{0,2}}{p_1} = \left(\frac{(\gamma+1)^2 M_1^2}{4\gamma M_1^2 - 2(\gamma-1)}\right)^{\gamma/(\gamma-1)} \frac{1-\gamma+2\gamma M_1^2}{\gamma+1}$

黑体, 六号

定常, 绝热, 无黏, 无体积力, 但不等熵。控制方程为 $\Delta(\rho u) = \Delta(p + \rho u^2) =$ $\left(2 \ \gamma \ M_1^2 - \ \gamma \ + 1 \right) rac{\left(\gamma - 1 \right) M_1^2 + 2}{\left(1 + \gamma \right)^2 M_1^2} \, , \quad rac{p_2}{p_1} = 1 + rac{2 \ \gamma}{\gamma + 1} \left(M_1^2 - 1 \right) \; .$ 正激波过后,熵增 $s_2 - s_1 =$ $c_p ln \Big\{ \Big[1 + rac{2\gamma}{\gamma+1} (M_1^2 - 1) \Big] rac{2 + (\gamma - 1) M_1^2}{(\gamma + 1) M_1^2} \Big\} - R ln \Big[1 + rac{2\gamma}{\gamma+1} (M_1^2 - 1) \Big]$ 。若来流马赫数小于 1,熵 减,由热力学第二定律,不存在这种情况。总压关系 $\frac{P0.2}{D0.1} = e^{-(S_2-S_1)/R} < 1$ 。普朗特关系 $a^{*2}=u_1u_2$ 。亚声速可压缩流中速度的测量,考虑绝热等熵,应用等熵关系式 $M_1^2=$ $\left| \frac{2}{|\mathbf{y}-\mathbf{j}|} \left| \left(\frac{\mathsf{P}_{0,1}}{\mathsf{p}_1} \right)^{(\gamma-1)/\gamma} - 1 \right|$ 。超声速可压缩流中速度的测量,考虑绝热不等熵,有正激波, $\frac{\left| p_{0,2} \right|}{p_1} = \left(\frac{ \left(\, \gamma + 1 \right)^2 M_1^2}{4 \, \gamma \, M_1^2 - 2 \left(\, \gamma - 1 \right)} \right)^{\gamma \, / \left(\, \gamma \, - 1 \right)} \frac{1 - \gamma + 2 \, \gamma \, M_1^2}{\gamma + 1} \ \, \text{.}$

定常,绝热,无黏,无体积力,但不等熵。控制方程为 $\Delta(\rho u) = \Delta(p + \rho u^2) = \Delta\left(h + \frac{u^2}{2}\right) = 0$, 得 $M_2^2 = rac{(y-1)M_1^2 + 2}{2\gamma M_1^2 - (y-1)}$ 。有R-H 关系式 $rac{
ho_2}{
ho_1} = rac{(y+1)M_1^2}{(y-1)M_1^2 + 2}$, $rac{T_2}{T_1} = \left(2\gamma M_1^2 - \gamma + 1
ight) rac{(y-1)M_1^2 + 2}{(1+\gamma)^2 M_1^2}$, $rac{p_2}{p_1} = 1 + rac{2\gamma}{y+1} \left(M_1^2 - \gamma + 1
ight) \left(M_1^2 - \gamma + 1
ight) rac{(y-1)M_1^2 + 2}{(1+\gamma)^2 M_1^2}$, $\frac{p_2}{p_1} = 1 + \frac{2\gamma}{y+1} \left(M_1^2 - \gamma + 1
ight) \left(M$ =1)。正激波过后,熵增 $s_2-s_1=c_p\ln\left\{\left[1+rac{2\gamma}{\gamma+1}\left(M_1^2-1
ight)
ight]rac{2+(\gamma-1)M_1^2}{(\gamma+1)M_1^2}
ight\}-R\ln\left[1+rac{2\gamma}{\gamma+1}\left(M_1^2-1
ight)
ight]$ 。若来流 马赫数小于 1,熵减,由热力学第二定律,不存在这种情况。总压关系 $\frac{p_{12}}{p_{2}} = e^{-(s_{2}-s_{1})/R} < 1$ 。普朗特 关系 $a^{*2}=u_1u_2$ 。亚声速可压缩流中速度的测量,考虑绝热等熵,应用等熵关系式 $M_1^2=$ $\frac{2}{y-1}\Big[\Big(rac{p_{0,1}}{p_1}\Big)^{(y-1)/\gamma}-1\Big]$ 。超声速可压缩流中速度的测量,考虑绝热不等熵,有正激波, $rac{p_{0,2}}{p_1}=\frac{1}{y-1}$

定常,绝热,无黏,无体积力,但不等熵。控制方程为 $\Delta(\rho u) = \Delta(p + \rho u^2) = \Delta(h + \frac{u^2}{2}) = 0$, 得 $M_2^2 =$ 后,熵增 $s_2-s_1=c_p ln \left\{\left[1+\frac{2\gamma}{\gamma+1}(M_1^2-1)\right] \frac{2+(\gamma-1)M_1^2}{(\gamma+1)M_1^2} - Rln \left[1+\frac{2\gamma}{\gamma+1}(M_1^2-1)\right] \right\}$ 。若来流马赫数小于 1,熵减,由热力学 第二定律,不存在这种情况。总压关系 $rac{p_{02}}{p_{01}}=e^{-(s_2-s_1)/R}$ < 1 。普朗特关系 $a^{*2}=u_1u_2$ 。亚声速可压缩流中速度的测量 考虑绝热等熵,应用等熵关系式 $M_1^2 = rac{2}{\gamma-1} \left[\left(rac{P_{12}}{p_1}
ight)^{\left(\gamma-1
ight)/\gamma} - 1
ight]$ 。 超声速可压缩流中速度的测量,考虑绝热不等熵,有正激 波, $\frac{p_{0,2}}{p_1} = \left(\frac{(\gamma+1)^2 M_1^2}{4\gamma M_1^2 - 2(\gamma-1)}\right)^{\gamma/(\gamma-1)} \frac{1-\gamma+2\gamma M_1^2}{\gamma+1}$

|定常,绝热,无黏,无体积力,但不等熵。控制方程为 $\Delta\left(\rho u\right) = \Delta\left(p + \rho u^2\right) = \Delta\left(\hbar + \frac{u^2}{2}\right) = 0$, 得 $M_2^2 = \frac{(v-1)M_1^2 + 2}{2\,vM_1^2 - (v-1)}$ 。 有 R+H 关系式 $\frac{\rho_2}{\rho_1} = \frac{(\gamma+1)h_1^2}{(\gamma-1)h_1^2+2}$, $\frac{\tau_2}{\tau_1} = \left(2\gamma M_1^2 - \gamma + 1\right) \frac{(\gamma-1)h_1^2+2}{(1+\gamma)^2h_1^2}$, $\frac{p_2}{p_1} = 1 + \frac{2\gamma}{\gamma+1} \left(M_1^2 - 1\right)$ 。正激波过后,熵增 $s_2 - s_1 = c_p \ln\left[1 + \frac{2\gamma}{\gamma+1} \left(M_1^2 - 1\right)\right]$ 。 $\frac{2}{\gamma-1} \left[\frac{\rho_0}{\rho_1} \right]^{(\gamma-1)/\gamma} - 1$ 。超声速可压缩流中速度的测量,考虑绝热不等熵,有正激波, $\frac{\rho_{02}}{\rho_1} = \left(\frac{(\gamma+1)^2 M_1^2}{4\gamma M_1^2 - 2(\gamma-1)} \right)^{\gamma/(\gamma-1)} \frac{1-\gamma+2\gamma M_1^2}{\gamma+1}$

微软雅黑,六号

定常,绝热,无黏,无体积力,但不等熵。控制方程为 $\Delta\left(\rho u\right) = \Delta\left(p + \rho u^2\right) = \Delta\left(h + \rho u^2\right)$ $1)\frac{\left(\gamma-1\right)M_1^2+2}{\left(1+\gamma\right)_{M_1^2}^2}, \quad \frac{p_2}{p_1}=1+\frac{2\gamma}{\gamma+1}(M_1^2-1)\text{ ... 正激皮过后,熵增 } s_2-s_1=c_pln\Bigg\{\Bigg[1+\frac{2\gamma}{\gamma+1}(M_1^2-1)\Big]$ 1)] $\frac{2+(\gamma-1)M_1^2}{(\nu+1)M_1^2}$ $\Big\}$ - Rln $\Big[1+\frac{2\gamma}{\nu+1}(M_1^2-1)\Big]$ 。 若来流马赫数小于 1,熵减,由热力学第二定 律,不存在这种情况。总压关系 $\frac{p_{0.2}}{p_{0.1}}=e^{-(s_2-s_1)/R}<1$ 。普朗特关系 $a^{*2}=u_1u_2$ 。亚声速可 压缩流中速度的测量,考虑绝热等熵,应用等熵关系式 $M_1^2 = \frac{2}{\gamma-1} \left| \left(\frac{P_{0.1}}{P_1} \right)^{(\gamma-1)/\gamma} - 1 \right|$ 。超 声速可压缩流中速度的测量,考虑绝热不等熵,有正激波,P02 =

微软雅黑,小六

定常,绝热,无黏,无体积力,但不等熵。控制方程为 $\Delta(\rho u) = \Delta(p + \rho u^2) = \Delta(h + \frac{u'}{2}) = 0$, 得 $\frac{p_2}{p_1} = 1 + \frac{2\gamma}{\nu+1} (M_1^2 - 1)$ 。 正激波过后,熵增 $s_2 - s_1 = c_p ln \left\{ \left[1 + \frac{2\gamma}{\nu+1} (M_1^2 - 1) \right] \frac{2 + (\gamma - 1) M_1^2}{(\nu+1) M_1^2} \right\} - Rln[1 + (\gamma - 1)] \frac{2 + (\gamma - 1) M_1^2}{(\nu+1) M_1^2} \right\}$ $\left| \frac{2V}{v+1} \left(M_1^2 - 1 \right) \right|$ 。若来流马赫数小于 1,熵减,由热力学第二定律,不存在这种情况。总压关系 $\frac{\Omega_0}{\Omega_{n+1}}$ $|e^{-(s_2-s_1)/R} < 1$ 。 普朗特关系 $a^{*2} = u_1u_2$ 。 亚声速可压缩流中速度的测量,考虑绝热等熵,应用等熵关 系式 $M_1^2 = \frac{2}{N-1} \left| \left(\frac{p_{0,1}}{p_1} \right)^{(\gamma-1)/\gamma} - 1 \right|$ 。超声速可压缩流中速度的测量,考虑绝热不等熵,有正激波, $\frac{p_{0,2}}{p_1} = \frac{2}{N-1}$ $\left(\frac{\left(\gamma\!+\!1\right)^{2}\!M_{1}^{2}}{4\gamma\!M_{1}^{2}\!-\!2\left(\gamma\!-\!1\right)}\right)^{\!\gamma/\left(\gamma\!-\!1\right)}\frac{1\!-\!\gamma\!+\!2\gamma\!M_{1}^{2}}{\nu\!+\!1}.$

微软雅黑,七号

| 定常,绝热,无黏,无体积力,但不等熵。控制方程为 $\Delta\left(\rho u\right) = \Delta\left(p + \rho u^2\right) = \Delta\left(h + \frac{u^2}{2}\right) = 0$, 得 $M_2^2 = \frac{(\nu-1)^{M_1^2+2}}{2M_1^2-(\nu-1)}$ 有 R-H 关系式 $\frac{\rho_2}{\rho_1} = \frac{(\gamma+1)M_1^2}{(\gamma-1)M_1^2+2}$, $\frac{T_2}{T_1} = \left(2\gamma M_1^2 - \gamma + 1\right) \frac{(\gamma-1)M_1^2+2}{(1+\gamma)^2M_1^2}$, $\frac{\rho_2}{\rho_1} = 1 + \frac{2\gamma}{\gamma+1} (M_1^2 - 1)$ 。 正熟废过后,熵增 $s_2 - s_1 = 1 + \frac{2\gamma}{\gamma+1} (M_1^2 - 1)$ 。 $\left| c_p \ln \left\{ \left[1 + rac{2\gamma}{\gamma + 1} (M_1^2 - 1)
ight] rac{2 + (\gamma - 1) M_1^2}{(\gamma + 1) M_1^2}
ight\} - R \ln \left[1 + rac{2\gamma}{\gamma + 1} (M_1^2 - 1)
ight]$ 。 若来流马赫数小于 1,熵减,由热力学第二定律,不存在这 种情况。总压关系 $\frac{P_{02}}{r^{-2}}=e^{-(s_2-s_1)/R}<1$ 。普朗特关系 $a^{*2}=u_1u_2$ 。亚声速可压缩流中速度的测量,考虑 爛关系式 $M_1^2 = \frac{2}{y-1} \left[\frac{(p_{11})}{(p_{11})} (y-1)/y - 1 \right]$ 。 超声速可压缩流中速度的测量,考虑绝热不等熵,有正激波, $\frac{p_{12}}{p_1} = \frac{1}{y-1} \left[\frac{p_{12}}{(p_{11})} (y-1)/y - 1 \right]$ $\left(\frac{\left(\gamma+1\right)^{2}M_{1}^{2}}{4\gamma M_{1}^{2}-2\left(\gamma-1\right)}\right)^{\gamma/\left(\gamma-1\right)} \frac{1-\gamma+2\gamma M_{1}^{2}}{\gamma L^{2}}$