Given $\rightarrow \nu_M \rightarrow$ Solve for corresponding M

$$\boxed{\nu_M = \sqrt{\frac{\gamma+1}{\gamma-1}}\tan^{-1}\sqrt{\frac{\gamma-1}{\gamma+1}\cdot\left(M^2-1\right)} - \sqrt{M^2-1}} \rightarrow Derivative \rightarrow \boxed{\frac{d}{dM}\nu\left(M\right) = \frac{1}{M}\cdot\left(\frac{\sqrt{M^2-1}}{1+\frac{\gamma-1}{2}\cdot M^2}\right)}$$

Assume Starting *Solution* $\rightarrow M_{(j)}$

Expand in Taylor's Series

$$\nu_M = \nu\left(M_{(j)}\right) + \frac{d}{dM}\nu\left(M\right)\Big|_{M_{(j)}}\cdot\left(M - M_{(j)}\right) + H.O.Terms \rightarrow Solve\ for\ M$$

$$M = M_{(j)} + \frac{\nu_M - \nu\left(M_{(j)}\right)}{\frac{d}{dM}\nu\left(M\right)\Big|_{M_{(j)}}} + \frac{H.O.Terms}{\frac{d}{dM}\nu\left(M\right)\Big|_{M_{(j)}}}$$

Truncate after first order $\rightarrow M_{(j+1)}$ *Approximates M*

$$\boxed{\begin{array}{l}\textit{Recursive Algorithm}\\ M_{(j+1)} = M_{(j)} + \dfrac{\nu_M - \nu\left(M_{(j)}\right)}{\frac{d}{dM}\nu\left(M\right)\Big|_{M_{(j)}}}\end{array}}$$

Drop from Loop when

$$\left|\frac{\nu_M - \nu\left(M_{(j+1)}\right)}{\nu_M}\right| < \varepsilon$$