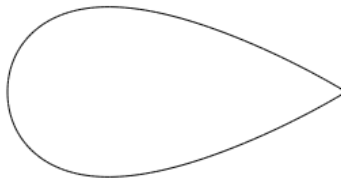


Visual Compressibility via PG

WARNING: Please don't think that these streamlines accurately represent the NACA 0050 at Mach 0.90. This analysis is purely considering the visual effect of compressibility. This process occurs for thinner sections, but the transformation is not as dramatic.

NACA 0050
Thickness Exaggerated for effect
Mach = 0.9

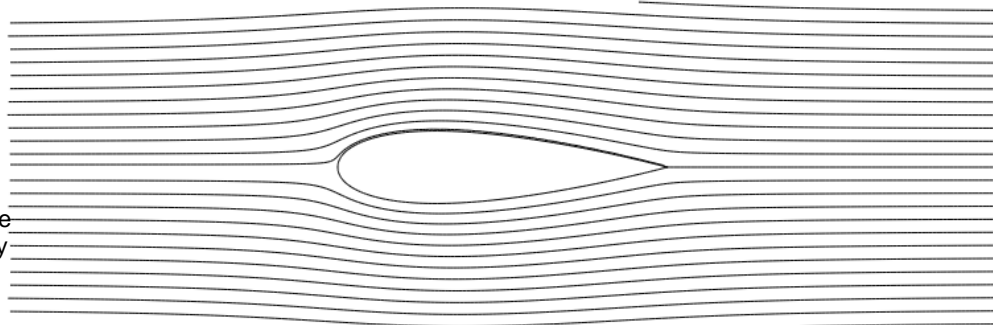


WARNING: PG requires small v and w perturbations. This NACA 0050 fails that requirement.

Transform with PG
Beta = 0.43

$$y'' = 0.43 y$$
$$x'' = x$$

Solve incompressible flow about effectively an NACA 0022

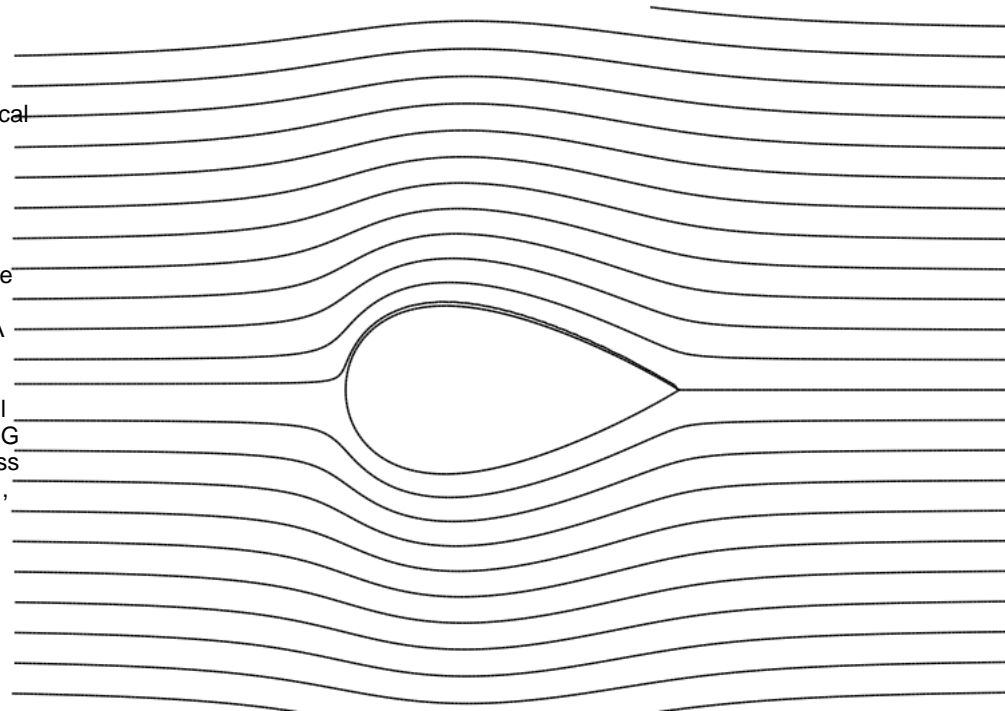


Rescale back to physical dimensions

$$y = 2.29 y''$$
$$x = x''$$

This is the PG estimate of the streamlines at Mach 0.9 for an NACA 0050.

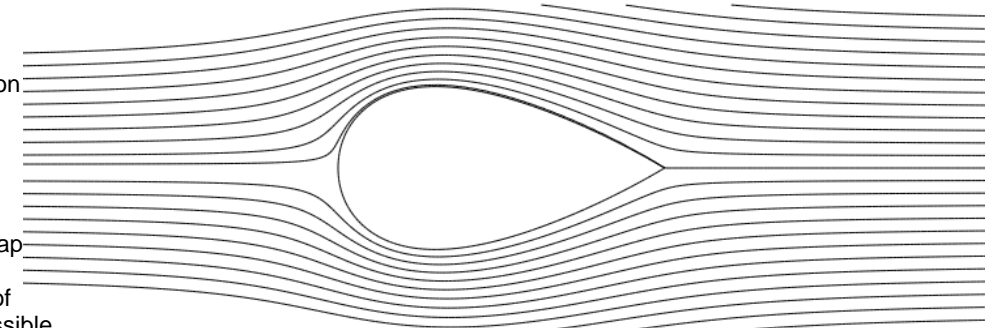
The actual solution will contain shocks. The PG transform becomes less accurate as M nears 1, since the higher order TSD approximation terms were dropped.



This is the equivalent incompressible solution for an NACA 0050.

Pay attention to the streamlines.

Remember that the gap between streamlines is a visual indication of velocity for incompressible flows.



Visual comparison of incompressible (dashed line) and compressible (solid line) for exaggerated NACA 0050 case at Mach 0.9.
Consistent with previous analysis, streamlines in compressible flows tend to thicken and propagate outward further.

