Under the happiest circumstances, a perturbation solution leads to altogether satisfactory results. The series cannot often be presumed to converge, particularly for parameter perturbations. Nevertheless, its asymptotic nature means that a few terms may yield ample accuracy for reasonably small ε, everywhere in the flow field. Such uniform validity appears to be true for example, of the Janzen-Rayleigh expansion below the critical Mach number. One speaks the of a ***regular perturbation*** *problem.*

On the other hand, one may find that the straightforward perturbation solution is not uniformly valid throughout the flow field. The best known example is the unseperated viscous flow at high Reynolds numbers, where a perturbation of the basic inviscid motion fails near the surface, and must be supplemented by the boundary layer approximation. Not only does the first approximation break down the locally in such cases, but the difficult is compounded in higher approximations-if they can be calculated at all-so that in the region of non-uniformity the solution grows worse rather than better. One then speaks of a ***singular perturbation*** *problem.*

Milton Van Dyke