ABSTRACT

An attempt has been made to develop numerical methods for the calculation of various problems associated with low speed flow past aerofoils and wings using 'viscous-inviscid interaction technique'. The methods use a panel technique for the external inviscid flow calculation and an integral method for the boundary layer calculation. Two alternative forms of panel method are used. These are- (a) internal singularity distribution method in which a distribution of singularities is placed interior to the body surface and (b) equal singularity method in which the singularities are placed on the body surface with the assumption that the strength of the singularities on a panel on the lower surface is equal to the strength of the singularities on the corresponding upper surface panel. The two solutions are then matched by using surface transpiration model in an iterative manner. The methods are applied to the following flow problems:

i) flow round multiple section aerofoils considering wake boundary layer interaction.

ii) flow past three dimensional clean wings. (using both 3-dimensional boundary layer correction scheme and 2-dimensional boundary layer correction in the strip theory sense)

iii) flow past multiple section wings. (using 2-dimensional boundary layer correction considering

wake boundary layer interaction in the strip theory sense)

Computer programmes suitable for commonly available micro/mini computer are developed in Fortran 77 for all these cases. To assess the accuracy of the present calculation methods the results are compared with the experimental values as far as possible. For the multiple section wing case no experimental result could be found in published literature and results for one particular planform shape are compared with the experimental values measured by the author. The agreement in almost all cases is quite satisfactory.