PREFACE

For the estimation of discharge in open channels the literature is replete with a number of equations such as those enunciated by Chezy, Kutter, Manning, Bazin and others. In recent times more refined equations have also been deduced by Keulegan based upon similar procedures as those adopted in the classical studies for flow through pipes by Prandtl, Karman, Nikuradse and others. However, the above equations were deduced making simplifying assumptions, which are applicable to wide channels. Some investigations have also been made in recent times for the case of circular channels and channels of triangular shape. It is interesting to note that the equations deduced for wide channels are not applicable for channels of narrow section because of certain special features which will be referred to below.

The present studies are limited in scope to narrow channels of rectangular and trapezoidal form with aspect ratios in the range of 0.85 to 3.61 and with different bed slopes. Furthermore the channels are assumed to have rigid and smooth boundaries. Such channels are generally met within Hydro-electric schemes for conveyance of water in flumes and conduits. For gaining insight into the flow characteristics in channels, a commendable approach that is made in recent times is to study the drag distribution along the wetted perimeter. A convenient tool that is developed for the purpose of measuring the shear stress distribution, is the Preston tube technique.

In the present studies, experimental investigations have been carried out on narrow channels of rectangular and trapezoidal section. The detailed drag distribution for all these channels has been studied besides velocity distribution and isovel patterns over the entire sections. The analysis of the data has revealed the manner in which the shape of the cross-section affects the drag distribution and consequently the velocity distribution. The role of secondary currents in bringing about the above changes is brought to light. The laws usually applicable to wide channels are not found to hold good for narrow channels. The degree of variance is studied in correlation with varying aspect ratios. It is hoped that the investigations carried out by the author may furnish research workers with new knowledge in an area which merits close investigations. Some problems for future studies stemming from the present investigations are also outlined.

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