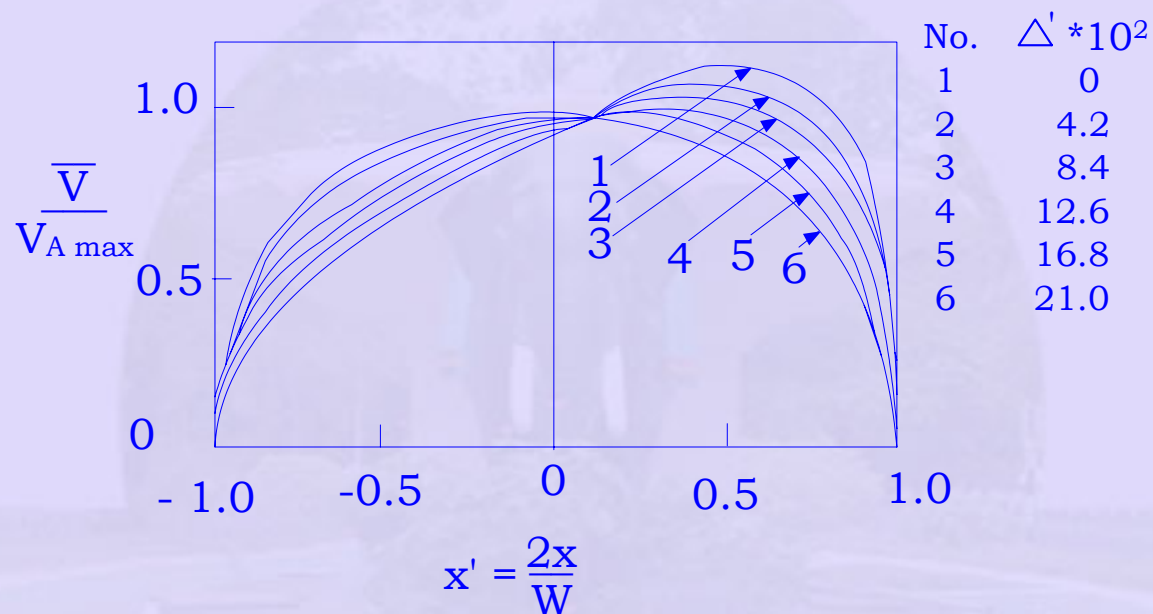


36.5 VELOCITY DISTRIBUTION IN BENDS

In natural stream bend the velocity distribution is extremely complex. This consists of superimposition of main velocity on secondary currents. The distribution consists of longitudinal velocities, which vary proximately to the bed, bank, and water surface and related with many variables. The best method to describe the velocity is to measure in rivers. However, theoretical expressions have been obtained assuming logarithmic law. For a gentle bend of a parabolic cross section variation of velocity distribution is presented in Figure along the bend section



Lateral Distribution of Velocity
in an Alluvial Channel Bend

($\Delta' = 0.42 \theta y_{\max} \frac{\sqrt{g}}{b * C}$) with an assumption of approach velocity to follow the relation.

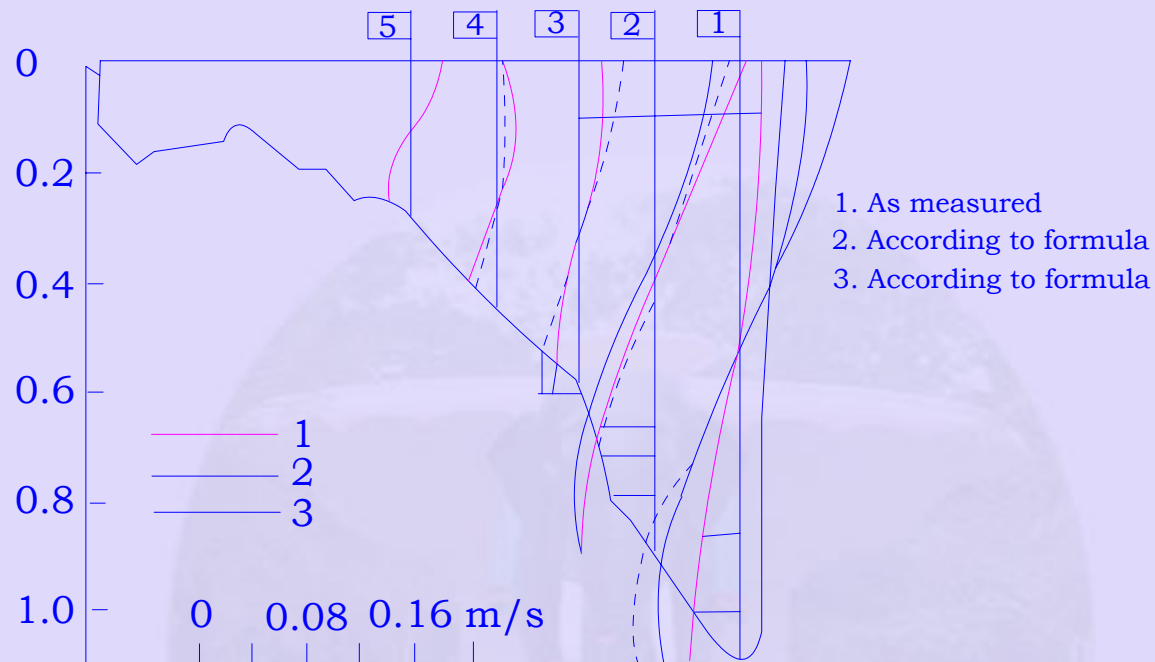
$$\frac{\bar{V}}{V_{A_{\max}}} = \left(\frac{y}{y_{\max}} \right)^{0.4}$$

and depth profile as

$$\frac{y}{y_{\max}} = \left(1 - \frac{2x}{b} \right)^2$$

in which x is reckoned from the center of the bend cross section. It can also be seen that velocity in bend is greater as the Chezy C decreases and as $\frac{y_{\max}}{b}$ increases.

Figure shows the typical velocity distribution as measured by Rozoskii. He has detailed a procedure to compute the non erosive velocity in a bend.



Comparison of theoretical formulas with data field observation on the Snov River, after Rozovskii (1957)

Reference

Rozovskii, I.L., " Flow of water in bends of open channels", Published by the academy of Sci. Ukrainian SSR, Kiev, 1957.