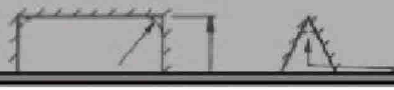

Substituting $U = Q/A$ and the hydraulic diameter into the friction coefficient equation and rearranging gives

$$H = fL\frac{Q^2}{8g}\frac{P_r}{A^3}$$

The hydraulic diameter concept is adequate provided that the P_r/A^3 of the cross-section is not significantly greater than that of any other cross-section than can be drawn inside it.

By rounding the corners of the cross-sections in Fig. 5.7 it is possible to reduce P_r/A^3 by only 1 per cent, so the hydraulic diameter concept is adequate. Cross-sections with small areas influenced by a disproportionate amount of perimeter, as in the cross-section of Fig. 5.8, have P_r/A^3 ratios larger than that of another cross-section that can be fitted within their perimeters. In the case of the cross-section shown in Fig. 5.8, the minimum P_r/A^3 would

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