form threads)[1,4–6] also exhibited vortex inhibition at the lowest concentrations. An interesting observation was that guar gum showed almost no filament formation or vortex inhibition up to concentrations of 1,000 w.p.p.m. Guar gum may reduce drag through the mechanism of solid suspensions, rather than through the mechanism for polymer solutions which is presumed to be different. This is suggested to some extent by the work of Pruitt *et al.*[7].

Our results demonstrate vortex inhibition to be a sensitive measure of the drag reducing ability of a polymeric additive. Both drag reduction and vortex inhibition appear to be related to filament formation, although this conclusion is still rather tentative.

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Flow at the Junction of Two Pipes: the Shape of the Separation Surface

Deakin and Blest[1] have reported observations of the flow approaching a pipe junction which show, apparently, a separation surface reminiscent in shape of an antique bow (Fig. 1). They draw attention to the marked dip in the curves close to the line of symmetry, which they find consistently over a wide range of experimental conditions, and see this feature as a particular challenge to any theoretical treatment of the flow. Their experimental measurements admit, however, of an alternative interpretation which eliminates this intriguing feature and which, I suggest, there are good reasons for preferring.

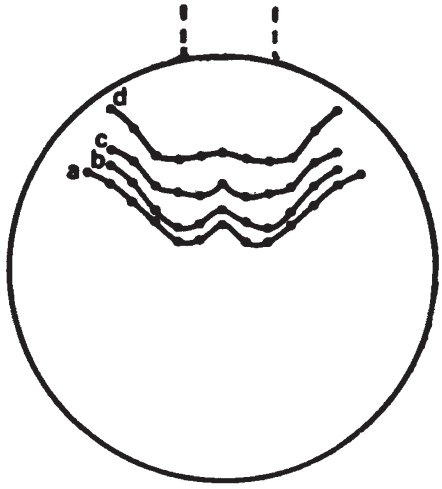

Fig. 1 Separation surfaces for $Re=123.7$, $d/D=0.212$. *a*, $\beta=0.107$; *b*, $\beta=0.083$; *c*, $\beta=0.061$; *d*, $\beta=0.041$.

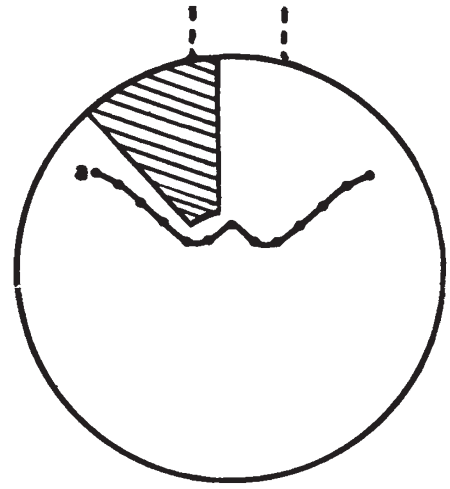

Fig. 2 Flow rate check for $d/D=0.107$.

Deakin and Blest observed the position of the dividing stream surface over one half of the pipe only, at a station approximately 0.75 *D* upstream from the junction. They then constructed the patterns in Fig. 1 by arguing that the flow would be symmetrical about the geometric plane of symmetry. The interpretation suggested here is that their flow was not symmetrical but, rather, that there was slight swirl in the flow approaching the junction. Thus, at the measuring station, the fluid to be removed had a lobe-shaped cross section displaced circumferentially from the line of symmetry.

The basis of this suggestion is the requirement of consistency between the measured flow rates through the two branches of the pipe and the relative flow rates implied by the shape of the dividing stream surface. The curves, as drawn in Fig. 1, cut off more than twice the flow that was measured passing through the branch pipe. If we accept the authors' proposition that the velocity profile in the pipe would be parabolic—and at the Reynolds numbers cited this seems entirely reasonable—it is a simple matter to determine the flow rate through any partial cross section of the inlet pipe. In Fig. 2, for example, the area beneath the dividing stream surface from Fig. 1 for the largest branch flow rate, $\beta=0.107$, is compared with that of an annular segment (inner radius 0.1 *D*, included angle 37.8°) which divides a flow with parabolic velocity profile in the ratio 0.107 : 1. Fig. 2 provides strong support for the interpretation set out above. There are three conclusions which seem worth drawing. First, continuity arguments based on the expected form of the velocity profile can, in internal flows of this type, provide a valuable supplement to other experimental techniques. Second, in fluid mechanics the assumption of symmetry is not without its pitfalls. Third, if unexpected swirl in a geometrically symmetrical situation can seriously influence experimental results, it could presumably be of great importance in the real situation which the experiment seeks to model.

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Carbonate Species and not Polywater formed on Magnesium Oxide

THE infrared spectrum of polywater formed on magnesium oxide, as presented by Middlehurst and Fisher[1], can more readily be interpreted in terms of the presence of carbonate species. Magnesium oxide readily adsorbs carbon dioxide and the infrared spectra[2] of carbon dioxide and water adsorbed