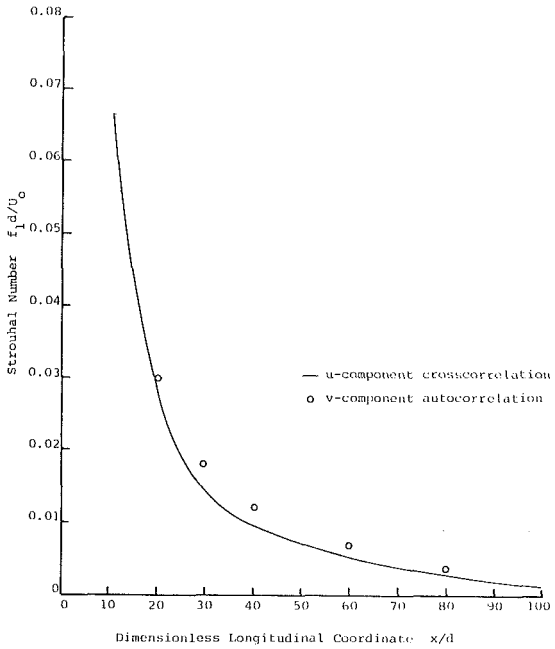

Fig. 11 Strouhal number $f_1 d/U_0$ versus x/d

DISCUSSION

P. Bradshaw[1]

This work seems to be an admirably conclusive demonstration that a distinct "flapping" correlation exits between the two sides of a jet, and that, at least in a jet with uniform exit flow, the flapping is a real part of the turbulence structure rather than an effective disturbed boundary condition. One now asks whether the correlation is entirely the result of pressure fluctuations ("irrotational motion") or whether the large eddies (i.e. vortical motions) extend significantly across the jet center line. In the former case one could still argue that the interaction between the two sides was weak enough to be ignored in turbulence modelling. The point might be settled by pressure-velocity correlations, or, better, by velocity correlations in and near a jet in a slow external stream, so that the irrorational field could be deduced from velocity fluctuations just outside the turbulent zone.

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Authors' Closure

We are grateful for Professor Bradshaw's comments. Only future and further research will authoritatively answer whether or not the correlation is due to pressure fluctuations or to large eddies. Recent photographs taken by K. Moallemi (M.S. thesis, Purdue University, 1980) tend to support the latter. "Smoke wire" visualization in the outer flow shows large scale structures extending well beyond the jet centerline even at positions as far as $X/D = 60$.