DISCUSSION

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The authors have provided us with additional information on the influence of system rotation on the stability of fluid motion. The principal result of this paper is that the effect of rotation is the same for free or confined shear layers. The experimental example used for characterizing free shear layer was an excellent choice. Substantial reference data exists from stationary experiments, and, as feedback to the specific example, itself, system rotation provided an easy and more controllable means for varying turbulent shear stress.

With regard to Fig. 2, the presence of the dashed line implies that the data points for AS = 15 and Reynolds number equal to 10,000 follow the dashed line, as the symbols do for AS = 5. However, the accompanying figure (Fig. 3) shows another possible interpretation. The two data points at Reynolds numbers of 19,000 and 28,000 only imply that additional data at these Reynolds numbers and higher rotation numbers might lie on the straight line defined by the data at Reynolds numbers of 3000 and 5500. Perhaps additional data might have revealed a trend that might not have made the data at the Reynolds number of 10,000 appear anomalous. In a similar example, for instance, sketch 1.2 of footnote 2 shows that turbulent wall-shear velocity on the leading face increases as rotation number increases up to a certain value and then becomes constant. The level reached depends on Reynolds number. Perhaps the shear between the entrained flow and the free stream is providing some similar phenomenon, even though the step is on the trailing face in this case.

The influence of aspect ratio shown in these tests results strongly suggest that the channel flow experiment of Reference 1 be rerun also investigate the influence of aspect ratio in channel flow. Investigation of the effect of the secondary-flow migration on trailing-face stability might provide information directly applicable to better understanding of the fluid motion in radial turbomachinery blading. It would be appreciated if the authors would indicate such results exist already.

Authors' Closure

The authors thank Mr. Pampreen for taking the time to provide comments. The dashed line in Fig. 2 was really only intended as a visual aide and we had not appreciated that it would imply a data trend. The solid lines, either ours or Mr. Pampreen's, only represent speculations; we would like to see much more data before any of these secondary data trends dealing with effects of Reynolds number or aspect ratio are believed. Work is in progress at Stanford to more closely examine the effects of Reynolds number on flow over backward facing steps in stationary systems. (A novel instrument has also been developed to measure the transitory flows near reattachment with much lower uncertainty than was previously possible.) The results of this work, soon to be reported, support and more fully describe the rather complicated effects of Reynolds number identified here and in references [8 and 13] of this paper.

The effects of aspect ratio in similar, fully developed, rotating channel flow have been examined rather thoroughly by John Moore and his predecessors at MIT. Additional information can be gleaned from the literature on rotating circular pipes.

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