Optimal harmonic forcing and drag reduction in pipe flow ASH-
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nique — A simple (RANS) model is used in combination with and explicit expression
for the eddy viscosity, to model the linear response of turbulent pipe flow to har-
monic forcing. Although the response is not so large as for the laminar case, it is
shown that the greatest response still occurs for forcing on the largest scale, i.e. on
the scale of the size of the domain. As this scale is independent of the flow rate, any
strategy for drag reduction on this scale should be practical over a large range of
Reynolds numbers. Also, as any drag reduction technique must modify the flow, it
is convenient that it the large-scale motion is the most efficiently induced. The only
question remaining, therefore, is whether the large scale motion can lead to drag
reduction in this geometry. In this work we show that forcing large scale motions
can produce competitive drag reduction and at little energetic cost.

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