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Homotopy between plane Couette flow and Pipe flow MASATO
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In order to investigate symmetry connections between two canonical shear flows,
i.e. plane Couette (PCF) and pipe flow (PF), which are linearly stable for all
Reynolds numbers and therefore undergo subcritical transition, we take annular
Poiseuille-Couette flow (APCF) as an intermediary Although PCF and PF are very
different geometrically, APCF recovers PCF by taking the narrow gap limit, and also
PF by taking the limit of vanishing inner cylinder where a homotopy of the basis
functions from no-slip to regular conditions at the centre is considered. We show
that the double-layered mirror-symmetric solutions in sliding Couette flow (APCF
without axial pressure gradient) found by Deguchi & Nagata (2011) can be traced
back to the mirror-symmetric solutions in PCF. Also we show that only the double-
layered solution successfully reaches the PF limit, reproducing the mirror-symmetric
solution in PF classified as M1 by Pringle & Kerswell (2007).

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