Physics > Fluid Dynamics

Modeling the transition to turbulence in shear flows

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One-dimensional models are presented for transitional shear flows. The models have two variables corresponding to turbulence intensity and mean shear. These variables evolve according to simple equations based on known properties of transitional turbulence. The first model considered is for pipe flow. A previous study modeled turbulence using a chaotic tent map. In the present work turbulence is modeled instead as multiplicative noise. This model captures the character of transitional pipe flow and contains metastable puffs, puff splitting, and slugs. These ideas are extended to a limited model of plane Couette flow.

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