

Abstract Submitted  
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**Turbulence Control in Pipe Flow by Means of Unsteady Driving**  
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Austria — Turbulent flows are responsible for huge energy losses in many diverse  
pumping applications ranging from heat exchange circuits to hydroelectric power  
plants. Several techniques to reduce frictional drag have been proposed over the last  
decades, however, very few have been tested experimentally and even less actually  
implemented. Based on the friction reducing properties observed in accelerating  
flows, we here propose a new approach to reducing drag by means of a pulsatile flow  
rate. We find 27% drag reduction in fully turbulent pipe flow in experiments and  
this is confirmed in direct numerical simulations. The optimal Reynolds number  
modulation is discussed. Different from many other drag reduction techniques, this  
operation mode does not require feedback loops, fluid additives or any modification  
to an existing pipeline.

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