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Drag reduction in turbulent pipe flow by applied electric potentials MAGNE WASKAAS, Telemark University College, TUC, Norway, VYTAUTAS DAUJOTIS, Vilnius University, VU, Lithuania , KJELL WOLDEN, TUC, RIMANTAS RAUDONIS, DEIVIS PLAUSINAITIS, VU — A novel approach to drag reduction is presented on the basis of applied positive electric potentials to a pipe. This has been studied by measuring the pressure drop over a 13.1 m epoxy-coated pipe made of carbon steel, through which water was flowing under conditions of constant flow rate. Potentials were applied between the pipe and the counter electrode located at the pipe inlet. The results show a decrease in the pressure drop (up to 2%) when positive electric DC-potentials in the range 0.6 – 1.6V were applied to the pipe. However, no significant changes was obtained for applied potentials in the ranges of 0 to 0.6 V, 1.6 to 2.0 V or 0 to -2.0 V. Waterflow through an epoxy coated turbine pipe (length 1562 m, diameter 1 m, total fall 380 m) in a hydroelectric power plant has also been studied. A 1.1 V potential was applied between the pipe and the manlock (made of stainless steel and electrically insulated from the pipe). Results show that the head loss decreased from 45.9 m to 39.8 m at maximum flow rate, which corresponds to a 1.8% increase in the electricity production. Although small, the effect represents the possibility of significant cost savings. The mechanism by which the drag is reduced is not currently understood.

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