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***A Variational Approach to Front Propagation in Infinte
Cylinders***

In their classical 1937 paper, Kolmogorov, Petrovsky and Piskunov proved that for a particular class of reaction-diffusion equations on a line the solution of the initial value problem with the initial data in the form of a unit step propagates at long times with constant velocity equal to that of a certain special traveling wave solution. This type of a propagation result has since been established for a number of general classes of reaction-diffusion-advection problems in cylinders. In this talk I will show that actually in the problems without advection or in the presence of transverse advection by a potential flow these results do not rely on the specifics of the problem. Instead, they are a consequence of the fact that the considered equation is a gradient flow in an exponentially weighted L^2 space generated by a certain functional, when the dynamics is considered in the reference frame moving with constant velocity along the cylinder axis. I will show that independently of the details of the problem only three propagation scenarios are possible in the above context: no propagation, a "pulled" front, or a "pushed" front. The choice of the scenario is completely characterized via a minimization problem.