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Stability of waves on fluid of infinite depth with constant vorticity

We will discuss the stability of periodic travelling waves on inviscid fluid of infinite depth when there is a constant background shear flow. We disregard the effects of both gravity and surface tension. In the basic state, the undisturbed waves are described by an exact solution that was presented recently by Hur and Wheeler (J. Fluid Mech., vol. 896, 2020). This solution is remarkable in that the wave profiles that it predicts coincide exactly with those found from the famous exact solution discovered by Crapper for pure capillary waves. We perform a linear stability analysis and compute growth rates using both an asymptotic approach which is appropriate for waves of small amplitude, and also using a numerical collocation method. We discuss both superharmonic and subharmonic perturbations. In particular we show that instability arises for any non-zero value of the base wave amplitude.