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# Experimental investigations salt-brackish wedge propagation in the presence of surface waves

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Aiming at the mitigation of climate changes caused by the fossil fuel consumption, renewable energy resources appears to be the most efficient and effective solutions. Osmotic energy is considered the most promising renewable energy source (Alteee et al., 2014). Such a kind of power plant requires a strong connection beetween fluvial and costal system for the fresh and salt water supplies. Indeed, the Pressure Retarded Osmosis (PRO) plant are designed to have an effluent discharge of brackish waters in the coastal environment.

The influence of wave motion on the salt-brackish wedge propagation in coastal regions has not been systematically investigated yet (Robinson et al, 2013), notwithstanding the fact that the problem is clearly relevant also in estuarine areas.

Here, the results of an experimental laboratory investigation on the propagation of a salt-brackish wedge in the presence of regular waves is presented. The lock-exchange schematization is considered to study the dynamics of the front and the instabilities at the interface.

It has been observed that the dynamics of the front has a pulsating behaviour, induced by the oscillating motion, with the period of the pulsations being equal to that of waves. Such a behaviour almost disappears with an increase of the reduced gravity. It has been also observed that an increase of wave period results in an increase of front velocity propagation.

The dynamics of the instabilities at the interface is strongly affected by the presence of regular waves. Indeed, the mixing length seems to be related to the particle displacement due to the oscillatory motion.

Finally, the presence of the waves significantly modifies (up to 30%) the dynamics of the front propagation by inducing a reduction/increase of the front velocity depending on the value of the reduced gravity.

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