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Surface waves generated by a moving electromagnetic force on electrolytes[1] GERARDO ALCALÁ, SERGIO CUEVAS, CIE UNAM, TERMOCIENCIAS TEAM — We present an experimental study of the gravity-capillary waves generated in the liquid-air interface of a shallow electrolytic layer ($NaHCO_3$) due to an electromagnetic force created by the interaction an applied direct electric current and a traveling magnetic field. The field is generated by a permanent magnet traveling in straight line externally to the bottom of the fluid container, and having a dominant component perpendicular to the plane spanned by the surface at equilibrium. Through long parallel electrodes, the current is applied transversally to the motion of the magnet so that the electromagnetic force points in favor or against the movement of the magnet, according to the polarity of either the electrodes or the magnet. The electromagnetic force acts as an obstacle for the flow (a magnetic obstacle) and, analogously to a moving solid body, generates a stationary wave pattern, which is reconstructed for various speeds of the magnet using optical methods. Differences in wave patterns are discussed for when the electromagnetic force points either in favor or against the movement of the magnet.

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