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Drift of an inextensible sheet caused by surface waves

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Inextensible films are often used to simulate surface-active material as commonly found at sea. It is important to understand the mechanism behind wave-induced transport of surfactants with regard to e.g. oil spills in coastal areas. In this paper we compare theory, based on a Lagrangian description of motion, with observations of the wave induced drift of thin inextensible plastic sheets in a controlled laboratory experiment. It is found that the analytical solution is able to reproduce the observed drift. In a laboratory situation with continuously generated, spatially damped waves, the drift velocity increases in time. Hence earlier theoretical treatments in which a steady state is assumed predict too low values of the drift velocity. The need for data on the time development of the drift is pointed out.