

Abstract Submitted
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Curved inclusions surf membrane waves ROIE SHLOMOVITZ,
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of Chemical Physics — There is mounting recent evidence for the existence and
biological importance of a large family of curved membrane proteins (CMPs). In
addition there is increasing interest in membrane waves, and the role they play in
cell function. In this theoretical work, we examine the interaction between CMPs
and membrane waves. We find that CMPs are advected on the cell surface by mem-
brane waves. We calculate the relative drift velocity of the CMPs with respect to the
wave velocity, for the case of sinusoidal waves. For relatively slow waves the CMPs
move at the wave velocity, i.e. “surfing the wave.” For fast waves the CMPs move
back and forth with a Stokes drift that is inversely proportional to the quadrant
of the wave velocity. For the more realistic case of decaying sinusoidal waves, we
determine the equilibrium distribution of the CMPs, and find that such waves create
a “hole” in the distribution of the CMPs on the cell membrane and calculate the
size of that hole. Based on these calculations, we show how such proteins can be
used in experiments to measure the properties of propagating membrane waves.

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