

NWS12-2012-000140

Abstract for an Invited Paper
for the NWS12 Meeting of
the American Physical Society

Obliquely Incident Solitary Wave onto a Vertical Wall

HARRY YEH, Oregon State University

When a solitary wave impinges obliquely onto a reflective vertical wall, it can take the formation of a Mach reflection (a geometrically similar reflection from acoustics). The mathematical theory predicts that the wave at the reflection can amplify not twice, but as high as four times the incident wave amplitude. Nevertheless, this theoretical four-fold amplification has not been verified by numerical or laboratory experiments. We discuss the discrepancies between the theory and the experiments; then, improve the theory with higher-order corrections. The modified theory results in substantial improvement and is now in good agreement with the numerical as well as our laboratory results. Our laboratory experiments indicate that the wave amplitude along the reflective wall can reach 0.91 times the quiescent water depth, which is higher than the maximum of a freely propagating solitary wave. Hence, this maximum runup 0.91 h would be possible even if the amplitude of the incident solitary wave were as small as 0.24 h . This wave behavior could provide an explanation for local variability of tsunami runup as well as for sneaker waves.