1051-76-245 **Chao Xie*** (xie@math.ohio-state.edu), 231 W 18th Ave, Columbus, OH 43210. *Singularities in the unphysical complex plane for deep water waves.*

This work resolves some questions on singularities in deep water waves by tracking singularities in the unphysical domain and relating their close approach to the real axis with wave breaking.

The main result is the direct verification of Tanveer's result. A boundary integral technique is used to simulate deep water wave motion. A spectral procedure is used to form-fit the Fourier spectrum of the curvature of the wave profile to a prescribed asymptotic expression. The form-fit provides information on the power and location of the closest singularity to the real axis. The power of the singularity is -3/2 when the curvature is expressed as a function of the Lagrangian variable. This is associated with a pole singularity in the complex arclength plane, and is not an artifact of the parametrization. The singularity approaches the real axis when a plunging breaker occurs. For nonbreaking waves, the singularity wanders above some level in the unphysical plane. It is established that this singularity is theoretically equivalent to Tanveer's one-half power singularity. When the surface elevation is viewed as a function of horizontal distance, a square root type singularity arises that takes the form of a breaking wave when it reaches the real axis of the horizontal coordinate. (Received August 25, 2009)