1046-65-2115 **Yin Lu Young*** (`yyoung@princeton.edu`), Dept. of Civil and Environmental Engineering, E-326, Princeton University, Princeton, NJ 08540, and **Margot Gerritsen** (`margot.gerritsen@stanford.edu`), 367 Panama Street, Department of Energy Resources Engineering, Stanford University, Stanford, CA 94305. *Marine Energy Technology: Riding the current.*

In search for cleaner, greener, and more reliable energy resources, the ocean is not left unexplored. Tidal turbines can extract energy from currents similar to the way wind turbines extract energy from airflows. Although the typical operating flow speed of tidal turbines is only one sixth of wind turbines, the power density is three times higher. The higher loads meant the blades may be subject to strength, fatigue, and stall problems. Tidal currents are bi-directional, and exhibit spatially and temporally variations due to the tidal boundary layer and interactions with waves and nearby boundaries. Another challenge with tidal turbines is cavitation, which can cause undesirable effects such as performance decay, erosion, noise, and vibration. In this work, we will present a 3-D panel method for the transient analysis of current turbines subject to spatially varying flows with consideration to fluid cavitation. To ensure structural integrity, the panel method is coupled with a 3-D finite element method to examine the blade stresses and dynamic characteristics. The formulation, numerical implementation, and sample results are shown. Plans to couple the method with a depth-integrated tidal flow model will also be presented. (Received September 18, 2008)