1035-35-1108 **Guoping Zhang*** (gzhang2@jewel.morgan.edu), Dept. of Mathematics, Morgan State University, 1700 E Cold Spring Ln, Baltimore, MD 21239, and **Zhijun Qiao**. *Cupsons and Smooth Solitons of the Degasperis-Procesi Equation Under Inhomogeneous Boundary Condition.*

We are going to present all possible single peak soliton solutions for the Degasperis-Procesi (DP) equation. Our work shows that the DP equation either has cusp soliton and smooth soliton solutions only under the inhomogeneous boundary condition $\lim_{|x|\to\infty} u = A \neq 0$, or possesses the regular peakon solutions $ce^{-|x-ct|}$ (c is the wave speed) only when . In particular, we first time obtain a stationary cuspon solution of the DP equation. Moreover we present new cusp solitons and smooth soliton solutions in an explicit form. Asymptotic analysis and numerical simulations are provided for smooth solitons and cusp solitons of the DP equation. (Received September 18, 2007)