1023-35-1316 **Guoping Zhang*** (gzhang@utpa.edu), Department of Mathematics, UTPA, 1201 W University Dr., Edinburg, TX 78539, and **Zhijun Qiao**. *A simple direct approach for constructing single solitons of nonlinear wave equations.* Preliminary report.

In this talk we introduce a simple direct approach to construct single soliton solutions of a large kind of nonlinear wave equations including Camassa-Holm (CH), Degasperis-Procesi (DP), KdV, and Schrödinger equations etc. We illustrate this approach through a deep study to CH and DP equations. It is well-know that the balanced wave equation

$$m_t + m_x u + bmu_x = 0,\ m = u - u_{xx}$$

is integrable only when $b = 2$ or $b = 3$ which correspond to CH equation and DP equation respectively. All possible one peak single soliton solutions have been found for both CH and DP equations under the boundary condition $u \to A$ ($A$ is a constant) as $x \to \pm\infty$. In particular, regular peakons of those equations correspond to the case of $A = 0$. For the case $A \neq 0$ both exact smooth soliton and cusp soliton are obtained by our approach. Mathematical analysis and numeric graphs are provided for those smooth soliton and cusp soliton. (Received September 25, 2006)