1046-35-269 **Maisa M Khader*** (khader@math.utk.edu), 1160 Kenesaw Ave #A1, Knoxville, TN 37919.
Critical Exponents for Semilinear Wave Equations with Space-Time Dependent Potential. Preliminary report.

Consider the Cauchy problem for the semi-linear damped wave equations

$$u_{tt} - \Delta u + a(t,x)u_t = |u|^p, \quad x \in \mathbf{R}^n, \quad t > 0, \tag{1}$$

and data in the energy space and compactly supported .

We studied the delicate balance between the time–space dependent potential in the dissipative term and the focusing nonlinearity. We will present sharp critical exponent results, namely to find a critical number p_{cr} such that

- If $1 < p \leq p_{cr}$ the solution blow–up in finite time, regardless of the smallness and smoothness of the initial data.
- If $p_{cr} < p < \frac{n+2}{n-2}$ there exist small data global solutions.

when $a(t,x) \sim a_0(1+|x|)^{-\alpha}(1+t)^{-\beta}$ for large $|x|$ and t; $a_0 > 0$, $\alpha \in [0,1)$, $\beta \in (-1,1)$, the critical exponent is

$$p_c(n,\alpha,\beta) = 1 + \frac{2(\beta+1)}{(n-2)(\beta+1)+2-\alpha}.$$

These results required knowledge of the precise decays rate of the corresponding linear problem with time–space dependent potential, which by itself is very intriguing problem. (Received August 24, 2008)