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Xuecheng Wang* (xuecheng@math.princeton.edu), 408 Fine Hall, Washington Road,
Princeton, NJ 08544. *Global infinite energy solutions for the 2D gravity water waves system.*

We consider the infinite depth gravity water waves system (without surface tension) in dimension two and prove the global existence and the modified scattering properties of solution for a class of initial data, which has arbitrary large energy and is small at the level above the Hamiltonian. More precisely, for the gravity water waves system, the Hamiltonian is at level $L^2 \times \dot{H}^{1/2}$, we only require smallness above the level $\dot{H}^{1/5} \times \dot{H}^{1/5+1/2}$ to derive global solution. Here $1/5$ is an absolute constant, it doesn't depend on the pre-assumed appropriate growth rate of Sobolev norm. Equivalently, for this class of initial data, the growth rate is subpolynomial and a typical example of initial data is that, it has a small, nonzero amplitude and flat for a long range and then goes to zero at infinity. (Received January 13, 2015)