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Ben T Nohara* (drben@tcu.ac.jp), 1-28-1, Tamazutsumi, Setagaya-ku, Tokyo, and **A Arimoto**. *Parameter Dependency on the Period of the Solutions for the Duffing Equation with Double-well Potential*. Preliminary report.

In this talk, we discuss the periodic solutions of the Duffing equation $\frac{d^2u}{dt^2} - au + bu^3 = 0$, where $u = u(t) : R \rightarrow R, t \geq 0, a, b > 0$, which has cubic non-linearity and a double-well potential. This equation is of importance in the mechanical engineering at discussing the nonlinearity as well as the dynamical system.

First, we show the phase portrait for understanding overall phenomena and present that all solutions can be written in the analytic forms using Jacobi elliptic functions. Solutions formulae depend on the potential, which is naturally induced from the equation. Also we show the exact period of the solutions using the complete elliptic integral of the first kind. Then we analyze the parameter-dependency “a” or “b” in the equation on the obtained periodic solutions. We show that there exists a maximum period when a parameter “a” varies. Also we present that the solution of the zero limitation of the parameter does not match the one of the original equation with zero parameter.

In the lecture the numerical simulations are also presented. (Received September 23, 2009)