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**Qinghua Luo\*** (qhluo@ou.edu), Department of Mathematics, University of Oklahoma, Norman, OK 73019. *Optimization Problem for Klein-Gordon Equation.*

We consider a damped Klein-Gordon equation with a variable diffusion coefficient. The goal is to derive necessary conditions for the optimal set of parameters minimizing the objective function  $J$ . First, we show that the solution map is continuous. Then the solution map is shown to be weakly Gâteaux differentiable on the admissible set  $P$ , implying the Gâteaux differentiability of the objective function. Finally we study the Fréchet differentiability of  $J$  and optimal parameters for these problems. Unlike the sine-Gordon equation, which has a bounded nonlinear term, Klein-Gordon equation requires stronger assumptions on the initial data. (Received September 21, 2011)