

**Summary of “Variational Equation Methods” for Calculating the Effects of a Parameter to a “Solution”.**

Title	Theorems	Problems/Solutions	Parameter $\theta$ may appear at:
Comparative statics	Implicit function theorem	First-order conditions (equations) for a differentiable optimization problem possibly with constraints.	Objective function, constraint equations.
Comparative dynamics	Peano’s theorem <sup>1</sup>	Solution of differential equations with an initial condition.	Differential equations, initial value, initial time.
	Lemma 2 of Oniki [1972] <sup>2</sup>	Solution of differential equations with an initial condition over two (or more) regions (phases) with possible kinks at boundaries.	Differential equations, initial value, initial time, boundary equations.
	Theorem of Oniki [1972] <sup>3</sup>	Solution of a (Pontryagin-type) optimal control problem: differential equations for state and co-state variables, control equations, initial and terminal (transversality) conditions.	The integrand of the objective function, differential equations for state variables, constraint functions of control and state variables, initial and terminal conditions for state variables, initial time, and terminal time.

<sup>1</sup> Oniki [1972], p. 273.

<sup>2</sup> *Ibid.*, pp. 274-275.

<sup>3</sup> *Ibid.*, pp. 276-278.

Reference: Oniki, H., [1973], “Comparative Dynamics (Sensitivity Analysis) in Optimal Control Theory,” *Journal of Economic Theory*, vol. 3, 1973, pp. 265-283.