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WICHEAN PUARUNGROJ : BACKCALCULATION FOR PAVEMENT LAYER MODULI FROM FWD DATA USING DYNAMIC ANALYSIS. THESIS ADVISOR : ASST.PROF. TEERAPONG SENJUNTICHAI, Ph.D. 123 pp. ISBN 974-03-1542-9.

This thesis is concerned with the development of a dynamic backcalculation program for estimating for elastic moduli of layered pavement from the nondestructive test by the Falling Weight Deflectometer (FWD). A layered pavement is modeled as a multi-layered elastic medium underlain by a rigid bedrock or a semi-infinite elastic soil. The analytical solutions for classical elastodynamics are used to derive the stiffness matrices of a typical layer in Laplace-Hankel transform domain. The assembly of layer stiffness matrices on the basis of interlayer continuity conditions results in the global equilibrium equations of the layered pavement. The global stiffness matrix is obtained and then solved for the time domain deflections by employing a numerical Laplace-Hankel inversion scheme. Elastic moduli are determined by using the nonlinear least square optimization method namely, modified Levenberg-Marquardt algorithm, to minimize the objective function, which is the difference between predicted and measured surface deflections. The results show that the vertical surface displacements from static analysis are higher than those obtained using the dynamic analysis. This indicates that the static analysis of the FWD overestimates the stiffnesses of the pavement layers. In addition, the backcalculation program developed in this thesis can be applied in the evaluation of structural capability of existing and newly road and runway pavement.