1035-76-270 **Sadia M. Makky*** (`sadia_makky@owens.edu`), 2635 Broadway Street, Apt 14, Toledo, OH 43609, and **Fadhel S. Fadhel**, University of Baghdad, Baghdad, Iraq. *VARIATIOHAL APPROACH FOR FREE BBOUNDARY PROBLEMS: A Seepage Problem With Singularity.*

Abstract Seepage in a vertical rectangular dam having an impervious horizontal base, and parallel vertical walls separating two reservoirs at different levels, is formulated as a free boundary value problem. The mathematical model of this seepage problem has a singularity at the separation point where the free boundary meets the fixed boundary. The problem is to find the velocity Potential, and the unknown surface, including this singular point. This is solved by finding an equivalent variational problem, whose Euler's equations are the governing equations for the free boundary problem; the solution is sought by representing the unknowns (the velocity potential and the free Surface), by a linear combination of a certain classes of Functions; "generalized Ritz method". In this article the singular point is given special attention and it is considered as a logarithmic singular point. A computer program is developed and used successfully to solve the resulting non-linear mathematical problem. (Received August 27, 2007)