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# A NUMERICAL STUDY OF A TWO-PHASE FREE BOUNDARY PROBLEM INVOLVING MOVING PHASE CHANGE MATERIAL AND VARIABLE THERMAL COEFFICIENTS

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## ABSTRACT

A free boundary problem is a non-linear problem that involves partial differential equation/equations in a domain in which a part of the boundary is not known in advance. The unknown portion of the boundary is called as the moving/free boundary. This unknown boundary is a part of the solution so we have to determine free boundary as well as solution of the problem simultaneously. Here, we present a complex two-phase free boundary problem which includes a moving phase change material and variable thermal coefficients. This problem is solved with the aid of boundary immobilization technique followed by the explicit finite-difference method. To check the validity of the scheme, the results for a particular case from the proposed scheme are compared with its exact solution. The stability and consistency of the proposed technique are also examined. This numerical study also explores the effects of parameters on the temperature profile and the corresponding free interface/boundary.

**Keywords** Two-phase free boundary problem · Finite difference method · Stefan problem

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