

**CONVERGENCE OF A LATTICE NUMERICAL METHOD
FOR A BOUNDARY-VALUE PROBLEM WITH FREE BOUNDARY
AND NONLINEAR NEUMANN BOUNDARY CONDITIONS***

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Abstract. We consider the Stefan-type diffusion boundary-value problem with free boundary and nonlinear Neumann boundary conditions. Such problems describe hydride formation under constant conditions when nonlinear surface processes are taken into account. We construct the difference numerical method and prove the convergence of the interpolation approximations to the weak solution of the problem. Then we apply the theory of boundary-value problems to show that this weak solution is the classical solution. Thus, the existence of the solution to the problem is proved and the difference method is justified.

Key words. Stefan-type problem, free boundary, nonlinear Neumann condition, existence of solution, difference scheme, uniform convergence of approximations

AMS subject classifications. 65N06, 65N12, 35K20, 35K60, 35R35, 35A05

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