

Let U be harmonic in D , a simply connected region in n -dimensional Euclidean space with smooth boundary C ; f be the restriction of U to C ; and g be the outward normal derivative of U on C . A Dirichlet-Neumann operator is an operator that maps f to g . Various properties of these operators and their generalizations are considered. In a Hilbert space, an initial-value problem for a second order differential equation involving a special class of these operators is investigated.

These results play a key role in the establishment of the linear “shallow water” theory, a theory which provides an important example of the approximation of the solution of an initial-boundary value problem for an elliptic partial differential equation by the solution of an initial-value problem for a hyperbolic partial differential equation.

This is joint work with Daniel A. Williams.