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SOLUTION OF SOME PRACTICAL POTENTIAL FLOW PROBLEMS BY MEANS OF NONORTHOGONAL EXPANSIONS. Don Kirkham and M. Sami Selim*, Ames. Using the Gram-Schmidt orthonormalization method to develop a nonorthogonal expansion process, it is shown that analytical solutions for a wide class of potential flow problems may be obtained. The method is particularly useful for flow regions of arbitrary shape and also for situations where boundary conditions of the mixed type may occur. As an application, the method is used to derive solutions for the following problems: (1) Electrostatic field and capacity of a conducting disc centered in a finite conducting sphere; (2) Potential flow for drain tubes surrounded by a gravel envelope; (3) Potential flow into circumferential openings in circular tubes. Tabulated numerical results from these solutions have direct practical applications.

Mathematics