

An introduction to the numerical solution of integral equations of the first kind: basic properties, discretization, regularization methods

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First-kind integral equations look formally similar to second-kind equations, but the underlying theory is very different. They appear in mathematical models that characterize many important applicative problems and are a typical example of an ill-posed problem. Indeed, some of them have infinitely many solutions, or no solution at all, and their discretization is typically ill-posed.

The lectures will present basic mathematical tools for their analysis, standard techniques for their discretization, and the ideas that allow regularization methods to select physically meaningful solutions.