

# Quaternionic Operator Methods in Fluid Dynamics

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**Abstract.** The paper is devoted to the consideration of an initial-boundary value fluid flow problem of Oseen's type. A brief historical introduction to fluid dynamics is given. A special time-discretisation method conveys the problem to a quaternionic Yukawa equation for the  $(k+1)$ -th time step of the fluid velocity in dependence on earlier times. Yukawa's problem can be decomposed into a product of two associated operators of Dirac's type with pure complex potential. With the help of a generalized Bergman projection the solution can be found by an iteration principle. The quaternionic operator calculus ensures that initial values and boundary values are fulfilled. Approximation and stability prove the convergence of the iteration process.

**Keywords.** Quaternionic analysis, Yukawa equation, semi-discretisation method, fluid flow problems.

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