Spectral properties of an Oseen-type operator, appearing in mathematical models of fluid flow past a rotating body

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We describe the spectrum of a linear Oseen–type operator which arises from equations of motion of a viscous incompressible fluid in the exterior of a rotating compact body. The operator is considered in the L^q–space. We show that the essential spectrum consists of an infinite set of overlapping parabolic regions in the left half–plane of the complex plane. The full spectrum coincides with the essential and continuous spectrum if the operator is considered in the whole 3D space. The proofs are based on the Fourier transform in the whole space and the transfer of the results to the exterior domain.