

## The oscillation of concentration field at the membrane–solution interface and transport mechanisms under overlimiting current density

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### ABSTRACT

Application of laser interferometry allowed visualization the process of formation and development of the concentration field at the boundary with cation-exchange membrane in a wide range of current densities. Using a cell with horizontally mounted membranes, Mach–Zehnder interferograms were obtained for the interface region of membrane  $10^{-2}$  M NaCl system at constant current intensities and continuous feed of solutions. With an increase of the current density the area of the solution involved in convection intermixing grows, and there appears a non-steady vibrational concentration profile. Video clips demonstrate auto-oscillation of interference band near the surface of ion-exchange membrane, which is proportional to the change of concentration. Digital analysis of video-images showed that with an increase of the current density a stationary state and the inherent order disappear which are changed by non-symmetrical oscillations of the concentration field in a solution.

**Keywords:** Ion-exchange membrane; Overlimiting current density; Concentration field; Convection instability

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