



Transformation of oil patches into spiral arms in compound vortex flow

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The transformation of surface oil patch is studied in compound vortex flow. The flow is produced by rotating disk in the cylindrical container partly filled with a homogeneous fluid. The oil patch partly gathers in compact volume at the bottom of a surface trough and the left part forms spiral arms on the free surface. At various modes of fluid rotation the observed pattern of free surface varies. At low frequencies of disk rotation an interface air-liquid insignificantly differs from flat, the whole surface is covered with “come off” small drops of oil. At increase in frequency of disk rotation separate drops come off an external edge of central patch and drift independently over free surface. The separate drops and the arms form “spiral pattern” on a surface of compound vortex. The oil patch fills nearly conic area directly under a fluid-air surface. The viscous lens considerably reduces size of a deflection of a free surface. The surface cavern becomes smooth in liquid-air contact area and on border water-oil. Flow patterns are compared with environmental observations.