# Coherent Turbulent Structures within Open-Channel Lateral Cavities

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**Abstract**

In the mixing layer at the interface between an open-channel flow and its adjacent lateral open-channel cavity, vortices are periodically shed and advected towards the downstream corner. As these vortices impinge the downstream corner of the cavity, they either reach the mainstream or enter the cavity. The presence of these coherent turbulent structures within the cavity plays a major role for momentum and mass transfers between the outer layer and the core region of the recirculation cell within the cavity. Using an experimental approach based on PIV measurements and a combination of proper orthogonal decomposition (POD) and coherent structure identification, we show that the vortices entering the cavity are advected by this gyre and can either travel all the way towards the upstream corner or end up in the core region of this gyre. Along their trajectory, they can split into smaller vortices and/or merge with others. Moreover, whereas the vortex shedding in the mixing layer is highly periodic, the entering of vortices in the cavity is intermittent. Indeed, near the downstream corner of the cavity, several successive vortices can be transferred from the mixing layer to the cavity or to the mainstream. In average, the vortices are distributed almost equally between the two downstream regions (mainstream or cavity) but we reported up to four successive vortices reaching the same region.