# Polygonal symmetry breaking of jets, sheets and hydraulic jumps due to viscoelasticity

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A jet of a Newtonian liquid impacting onto a wall at right angle spreads as a thin liquid sheet which preserves the radial symmetry of the jet. We observe that for a viscoelastic jet (solution of polyethylene glycol in water) this symmetry can break : close to the wall, the jet cross-section is faceted and radial steady liquid films (membranes) form, which connect the cross-section vertices to the sheet. The number of membranes increases with increasing viscoelastic relaxation time of the solution, but also with increasing jet velocity and decreasing distance from the jet nozzle to the wall. A mechanism for this surprising destabilization of the jet, which develops perpendicularly to the direction expected for a buckling mechanism, is presented that explains these dependences. The large-scale consequences of the jet destabilization on the sheet spreading and fragmentation, which show through faceted hydraulic jumps and suspended (Savart) sheets, will also be discussed.