# Fluids near Wedges, Apexes and Cones: Fluctuation Effects and Covariance Relations

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Wedge and conic geometries show filling phenomena analogous to the wetting of planar substrates. In particular long standing thermodynamic arguments predict that a wedge/cone in contact with a bulk vapor (at two-phase coexistence) is completely filled by liquid, if the contact angle is less than the tilt angle of the wedge/cone. We review recent studies of interfacial fluctuation effects at filling transitions in 2D, 3D wedges and 3D cones, which are predicted to be much stronger than those at wetting. A rather remarkable and unexpected feature of filling in some geometries is the existence of covariance relations, which precisely relate fluctuation effects at filling (even in systems with long-ranged intermolecular forces) to those at planar critical wetting transitions with short-ranged forces. A second type of covariance is also shown to occur, under very general circumstances, for complete wetting films near 2D and 3D apex geometries. As well as providing an effective means of manufacturing critical-wetting-like phase transitions in the laboratory, we argue that covariance is a fundamental unifying theme in fluid interfacial phenomena.