The surface forces (that is forces acting in thin liquid films/layer) were discovered in the beginning of the 20th century and it resulted in a breakthrough in understanding of stability and coagulation of colloidal suspensions/emulsions. It is well established that the range of surface forces action is around 100 nm. The components of those surface forces are: molecular (or dispersion, or Van der Waals) component, electrostatic component caused by an overlapping of electrical double layers of neighbouring charged surfaces, structural component caused by water dipoles orientation in a vicinity of surfaces of neighbouring surfaces and overlapping of those oriented layers, steric caused by overlapping adsorbed polymer/protein/surfactant layers and other components. A very important observation is as follows, the surface forces in thin liquid films in a vicinity of a three phase contact line include contributions of all the same components as in the case of interaction of colloidal particles: van der Waals, electrostatic, steric, interaction caused by the orientation of water dipoles at both water-solid and water–vapour interfaces. However, there is one very important difference in the case of droplets/menisci: interaction between identical colloidal particles or droplets is symmetrical, but the surface forces in thin liquid films in a vicinity of the three phase contact line are highly asymmetrical because two different interfaces are involved: a liquid–solid and a liquid–vapour. The latter feature determines the specific properties of wetting/spreading phenomena. Conditions for thermodynamic equilibrium of liquid drops on solid substrates are presented. It is shown that if surface force (disjoining/conjoining Derjaguin pressure) action in a vicinity of the three-phase contact line is taken into account the condition of thermodynamic equilibrium can be completely satisfied. The thermodynamic expressions for equilibrium contact angle of drops on solid substrates and menisci in thin capillaries are expressed in terms of the corresponding Derjaguin isotherm. It is shown that equilibrium contact angles of drops vary significantly depending on the vapour pressure in the ambient atmosphere, while there is a single, unique equilibrium contact angle in a thin capillary. It is also shown that the static advancing contact angle of a drop depends on its volume, in agreement with experimental data. In the case of menisci in capillaries, the expression for the receding contact angle is deduced, with results that are also in agreement with known experimental data.
