FM14S_10059

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Liquid Film Flow in Conical Capillary

N.P. Migoun, A.I. Shnipp

National Academy of Sciences, Minsk, Belarus

The phenomenon of two-side filling with some liquids of conical capillaries was established in 1989. During the last years comprehensive experimental data concerning this phenomenon were obtained. But till the present time there is a lack of its theoretical description. Theoretical model based on mathematical description of gas-vapor diffusion and phase transition (evaporation–condensation) in the cone's channel, which was presented at 19th ICATM in Kyoto, can't explain experimental results. Mathematical theory of the phenomenon based on liquid film flow along the capillary channel is presented in this paper. It is established that the mechanism of the phenomenon can be explained by a liquid film flow caused by the difference of capillary pressures at two liquid columns and stabilized by disjoining pressure in the liquid film. All main qualitative regularities of the process following from this theory are in a good correspondence with experimental results.

View the extended summary