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**TWO-DIMENSIONAL INK PRINTING SYSTEM MODEL   
WITH THREE FORM ROLLERS**

**M. I.Verkhola**

*Ukrainian Academy of Printing,   
19, Pid Holoskom St., Lviv, 79020, Ukraine  
m.i.werh@gmail.com*

***Research methodology.*** *To research the ink transmission and distribution processes in ink printing systems at the moment one-dimensional models are mainly in use, which give information only about the average ink layers thicknesses. In the process of this work implementation by developing two-dimensional ink printing system mathematical model with three form rollers, which more accurately describes ink transmission, methods of operational calculus, discrete transformation, graph theory and the automatic control theory were used.*

***Results.*** *A methodology of creating two-dimensional ink printing systems mathema­tical models was proposed. Based on this methodology we have developed two-dimensional ink printing system model with multi-zone ink feeding unit that recreates the processes of ink distribution and transmission as ink micro flows sets which circulating on all ink printing system elements surfaces. The model takes into account oscillating cylinders working modes that perform ink micro flows carrying in the axial direction. This model reflects more detail the processes occurring in ink printing systems of offset machines and enables to determine the paint layer thickness at any imprint point and at each element surface of ink printing system.*

***Novelty.*** *For the first time a two-dimensional ink printing system mathematical model has been developed that takes into account all its elements work and makes it possible to investigate the processes of ink distribution and transmission from a system input to imprint for different character of printing elements allocation on the form. This model can be a source of new knowledge concerning the ink transfer processes.*

***The practical significance.*** *Two-dimensional mathematical model takes into account the work of multi-zone ink feeding unit, oscillating cylinder and all other ink printing system components of small format offset machine Romajor-314 is the basis for the information technology development of the ink transfer processes analysis and the accuracy of tone reproduction determination and tune-up of these machines to print any image.*