Analytical Solutions in Two Cavity Coupling Problem, M.I. AYZATSKY, National Science Center, Kharkov Institute of Physics & Technology (KFTI) - A new mathematical method was used to obtain some analytical solutions to the equations that rigorously describe the coupling of two cavities through a cylindrical aperture. On the base of this method we have derived the Bethe's result by means of the limit transition in the general equations. The coupling coefficients up to the second-order approximation in (ka) (a = disk radius, k = free-space wavenumber) have been calculated.