$$x = \frac{316408}{348767}\left(1 - e^{\frac{-348767 \times 43}{DG h_{LV}}}\right) \quad \text{Eq 1}$$

$$j_G = \frac{Gx}{\rho_V} \qquad j_L = \frac{G(1-x)}{\rho_L}$$

x	j_L (m/s)	j_G (m/s)	$\rho_L j_L^2$	$\rho_V j_V^2$	flow pattern
0.2	0.09	0.6	417	105	slug
0.3	0.21	0.53	317	518	annular
0.4	0.31	0.46	243	1116	annular
0.6	0.46	0.36	146	2520	annular

3) Annular flow without droplet entrainment

2 momentum balance equations

$$\frac{d}{dz}\frac{G^2 x^2}{\rho_G R_G} = -R_G \frac{dP}{dz} + \tau_{iG} S_i + \Gamma_G U_i - \rho_G R_G g$$

$$\frac{d}{dz}\frac{G^2 (1-x)^2}{\rho_L R_L} = -R_L \frac{dP}{dz} + \frac{4\tau_p}{D} - \tau_{iG}\frac{S_i}{A} - \Gamma_G U_i - \rho_L R_L g$$

By elimination $\frac{dP}{dz}$ between the 2 équations and neglecting Γ_G, yields to an explicite equation to compute R_G