$$u = \frac{2D\beta\pi e^{-D\pi^2 t}\sin\pi x}{\alpha + \beta e^{-D\pi^2 t}\cos\pi x} = \frac{M}{N}$$

$$\Rightarrow u_t = \frac{(NM_t) - (MN_t)}{N^2}$$

$$u_x = \frac{(NM_x) - (MN_x)}{N^2}$$

$$uu_x = \left(\frac{M}{N}\right)(u_x) = \frac{MNM_x - M^2N_x}{N^3}$$

$$\Rightarrow u_t + uu_x = \frac{N^2M_t + MN(M_x - N_t) - M^2N_x}{N^3}$$

$$u_{xx} = \frac{\left[(N_xM_x) + (NM_{xx}) - (M_xN_x) - (MN_{xx})\right](N^2) - (2NN_x)(NM_x - MN_x)}{N^4}$$

$$\Rightarrow u_{xx} = \frac{\left[N(NM_{xx} - MN_{xx}) - 2NM_xN_x + 2MN_x^2\right]}{N^3}$$