

These are nonlinear coupled partial differential equations (PDEs) for mixed convection. Check if you can solve these equations by finite difference or any other numerical method. If you have any problem or question regarding the solution of these equations, please let me know.

$$u_y = 1 + x v^2 \quad (1)$$

$$v_{yy} - \lambda v u_y + \frac{(m+1)}{2} u v_y = (\lambda - m) x (u_y v_x - v_y u_x) \quad (2)$$

subject to boundary conditions

$$u(x, 0) = 0 \quad (3)$$

$$v(x, 0) = 1 \quad (4)$$

$$u_y(x, \infty) = 1 \quad (5)$$

$$v(x, \infty) = 0 \quad (6)$$

Take  $x = 0, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0$

$m = 0, 1/3, 1/2, 1$ , and

$\lambda = 0.5, 1, 1.5$

Generate figures and tables for  $u_y$ ,  $v$ , and  $v_y$  for different values of  $\lambda$  and  $m$ .

Note: If  $\infty$  bothers you, use any big number like 20 or 25.