Equations

$$\frac{\partial u}{\partial t}=\frac{\partial^2 u}{\partial y^2}-\Gamma\frac{\partial^3 u}{\partial y^2\partial t}+Gr\theta,$$

$$\Pr\frac{\partial \theta}{\partial t}=\frac{\partial^2 \theta}{\partial y^2},$$

$$u(y,0)=0,\quad \theta(y,0)=0;\quad y>0,$$

$$u(0,t)=0,\quad u(\infty,t)=0,\quad \theta(0,t)=1,\quad \theta(\infty,t)=0,$$

> $restart:$

> $with(plots):$

> $PDE := \left\{\frac{\partial}{\partial t}u(y,t)=\frac{\partial^2}{\partial y^2}u(y,t)+R\left(\frac{\partial^3}{\partial t\partial y^2}u(y,t)\right)+Gr\cdot z(y,t), Pr\left(\frac{\partial}{\partial t}z(y,t)\right)=\frac{\partial^2}{\partial y^2}z(y,t)\right\};$

$$PDE := \left\{Pr\left(\frac{\partial}{\partial t}z(y,t)\right)=\frac{\partial^2}{\partial y^2}z(y,t), \frac{\partial}{\partial t}u(y,t)=\frac{\partial^2}{\partial y^2}u(y,t)+R\left(\frac{\partial^3}{\partial y^2\,\partial t}u(y,t)\right)+Gr\,z(y,t)\right\}$$

> $IBC := \{u(y,0)=0, u(0,t)=0, u(10,t)=0, z(y,0)=0, z(0,t)=1, z(10,t)=0\};$

$$IBC := \{u(0,t)=0, u(10,t)=0, u(y,0)=0, z(0,t)=1, z(10,t)=0, z(y,0)=0\}$$

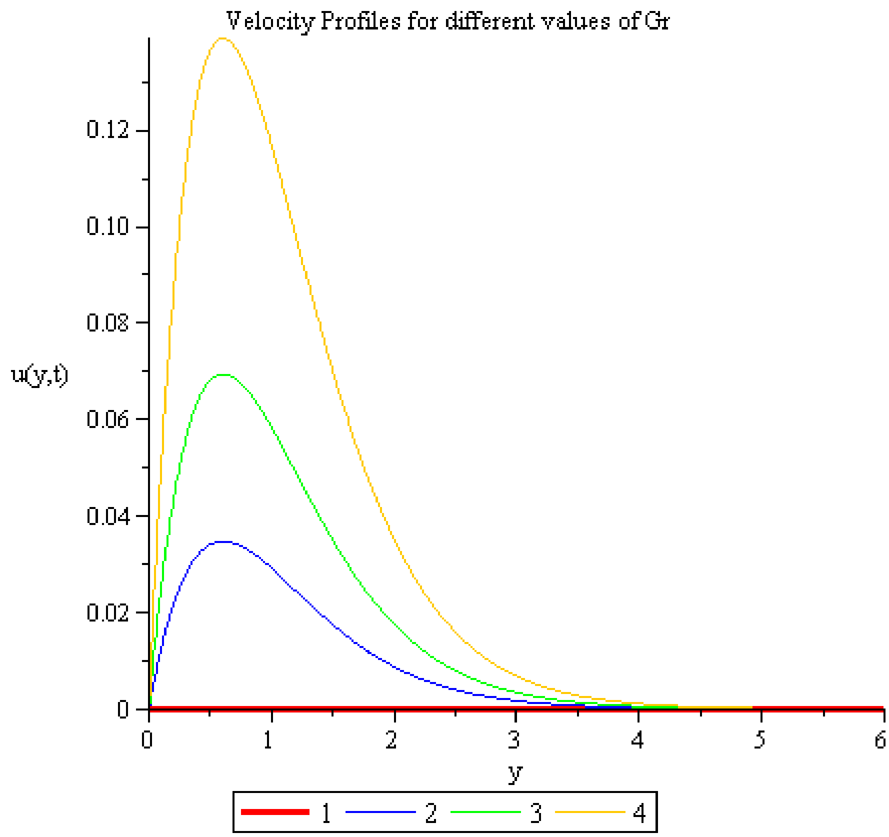
> $Pr := 0.71; R := 0.2;$

$$Pr := 0.71$$

$$R := 0.2$$

> **for** i **from** 1 **by** 1 **to** 4 **do** $Gr := L[i] : pds := pdsolve\left(PDE, IBC, numeric, spacestep=\frac{1}{100}\right) : \mathrm{p[i]} := plots[display]\left(\left[seq\left(pds{:-}plot\left(u, t=\frac{j}{10}, y=0..6, legend=[i]\right), j=4\right)\right]\right)$ **:end do**

> $display(\{p[1], p[2], p[3], p[4]\});$



R = 0.2, Pr = 0.71, t = 0.4 and Gr = 0.0, 0.5, 1.0, 2.0