figures 7.8-7.9d-f. These results can also be confirmed from the figure 7.5.

### 7.2.5 Conclusions

We have studied the effect of throughflow on overstability of Bénard-Darcy convection by performing a weakly nonlinear stability analysis resulting in the complex Ginzburg–Landau amplitude equation. The following conclusions are made upon the pervious analysis:

1. Upon increasing $Pr_D$, Nu and MNu increase, hence advances the onset of convection.
2. Upon increasing $\lambda_1$, Nu and MNu increase, hence advances the onset of convection.
3. Upon increasing $\lambda_2$, Nu and MNu decreases, hence delays the onset of convection.
4. Critical Rayleigh-Darcy number depends on $\lambda_1, \lambda_2$ for oscillatory case, but independent in stationary case.
5. Oscillatory mode exists only when the values of $\lambda_1, \lambda_2$ chosen according to the Eq. (7.2.20).
6. Supercritical pitch fork bifurcation exits for Eq. (7.2.31).
7. Throughflow $Q$ has strongly stabilizing effect on the system for oscillatory case, irrespective of the direction of the flow.
8. Throughflow $Q$ has both stabilizing and destabilizing effects, corresponding to downward and upward directions, for stationary case.
Figure 7.9: Isotherms for various values of time $s$ (a) $s = 0$ (b) $s = 1$ (c) $s = 2$ (d) $s = 3$ (e) $s = 6$ (f) $s = 8$