1 2D Example 1

We choose $\rho_0 = 0.25$ and

$$\hat{\rho} = 0.25(1-t) + t\frac{1}{4}((\cos(\pi y_1)+1)(\cos(\pi y_2)+1)),$$

as in last week's report. Note the control plots were wrong. Now below the correct ones. The four Figures 2,3, 4 and 5 show the optimal control for different parameters. The number of points is very small: $n = 10$, $N = 20$, but larger examples are running on the server.
For forward and optimal ρ the following results are copied in from last week as a reminder (with larger number of points): We choose $n = 20$, $N_1, N_2 = 30$. Tolerances are $10^{-8}/10^{-4}$. For $\beta = 10^{-3}$ and $\gamma = 1$, $J_{FW} = 0.0596$ and $J_{Opt} = 0.0170$, see 6, 7. For $\beta = 10^{-3}$ and $\gamma = -1$, $J_{FW} = 0.0334$ and $J_{Opt} = 0.0020$, see 8, 9.

Code for flux plots. Correct?

$PlotArea.NFlux = 30;$

$PlotArea.y1Min = -1;$

$PlotArea.y1Max = 1;$

$PlotArea.y2Min = -1;$

$PlotArea.y2Max = 1;$

$output1a.IDC.InterpolationPlotFlux(PlotArea)$

$flnorm = max(max(abs(output1a.OptimizationResult.Control)));$

$fl = Control(ti,:)';$

$maskAdd = fl > 10^-3;$

$output.IDC.plotFlux(fl, maskAdd, flnorm, 1.2,'k', false, 0);$

$output.IDC.plotStreamlines(fl, [], [], []);$

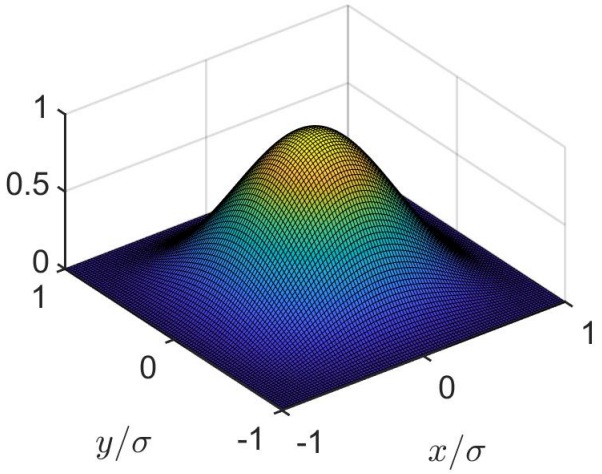

Figure 1: 2D Example 1, $\hat{\rho}$ at $t = T$

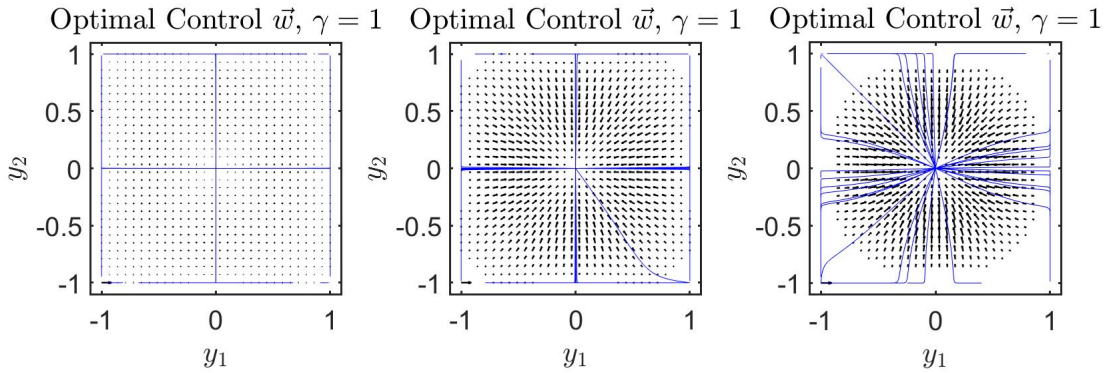

Figure 2: 2D Example 1, Control $\gamma = 1$, $\beta = 10^{-3}$, $t = 2, 5, 9$

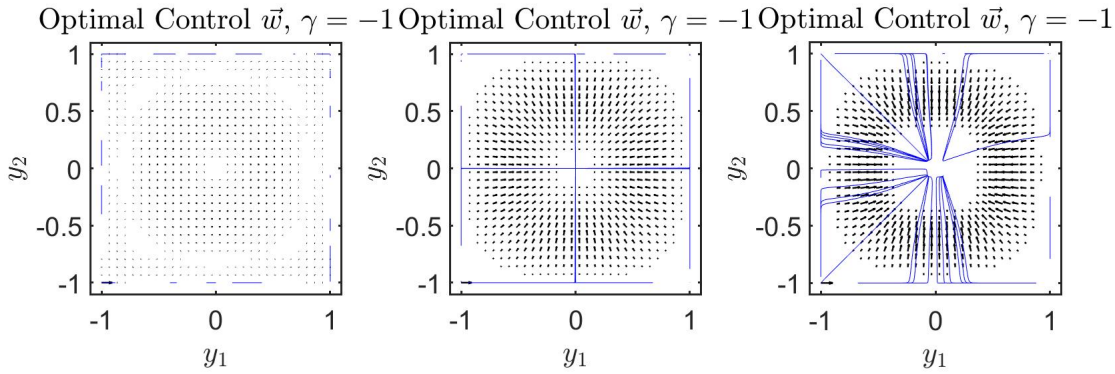

Figure 3: 2D Example 1, Control $\gamma = -1$, $\beta = 10^{-3}$, $t = 2, 5, 9$

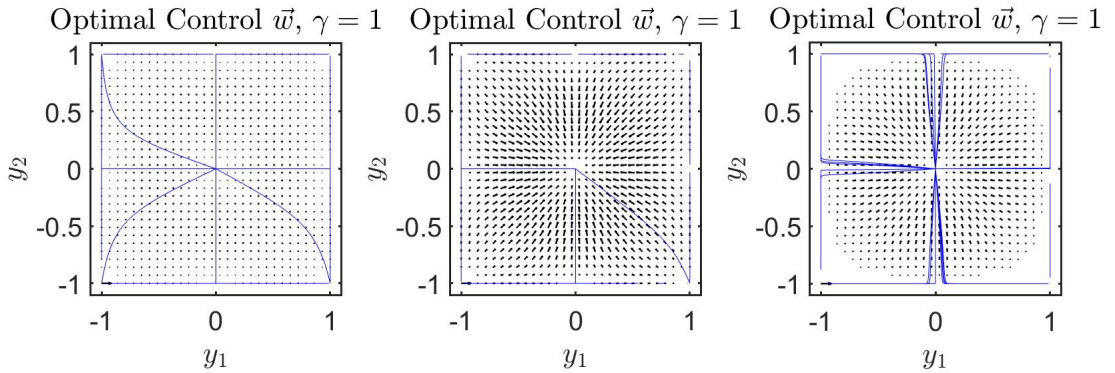

Figure 4: 2D Example 1, Control $\gamma = 1$, $\beta = 10^{-1}$, $t = 2, 5, 9$

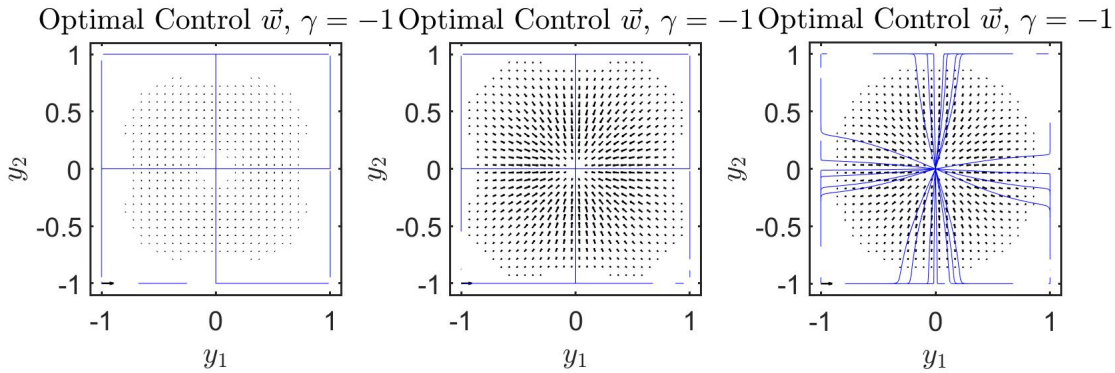

Figure 5: 2D Example 1, Control $\gamma = -1$, $\beta = 10^{-1}$, $t = 2, 5, 9$

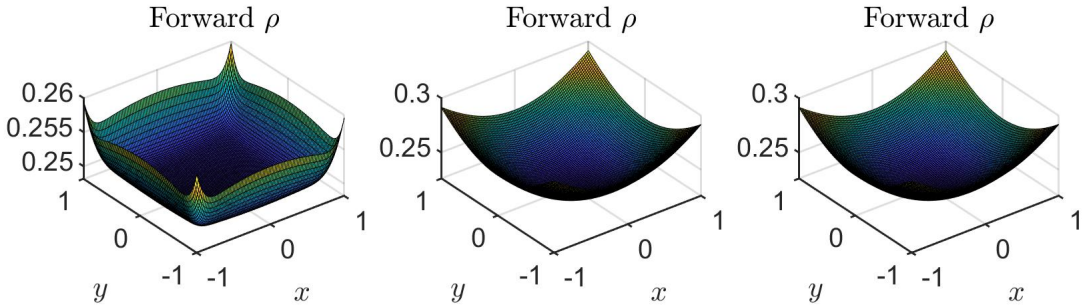

Figure 6: 2D Example 1, ρ forward, $t = 2, 10, 20$, $\beta = 10^{-3}$, $\gamma = 1$

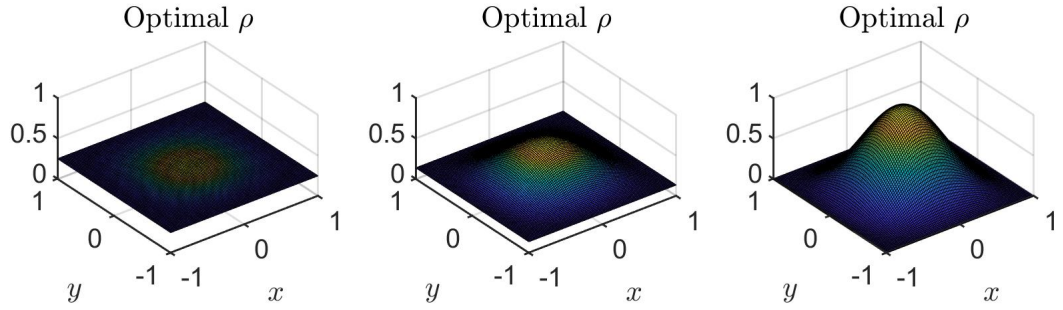

Figure 7: 2D Example 1, ρ optimal, $t = 2, 10, 20$, $\beta = 10^{-3}$, $\gamma = 1$

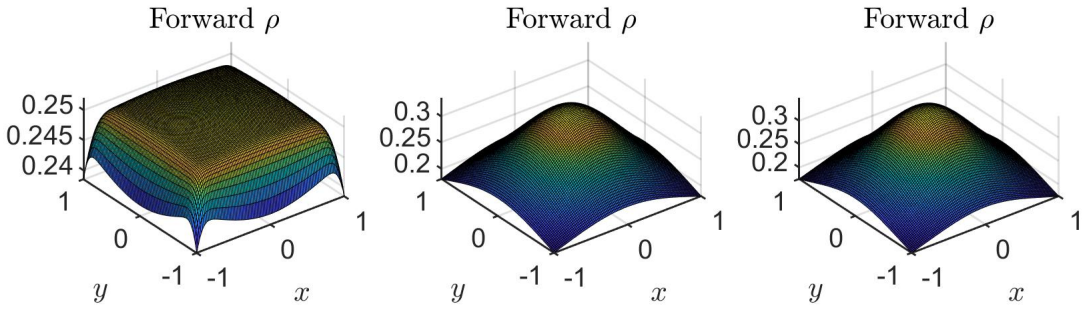

Figure 8: 2D Example 1, ρ forward, $t = 2, 10, 20$, $\beta = 10^{-3}$, $\gamma = -1$

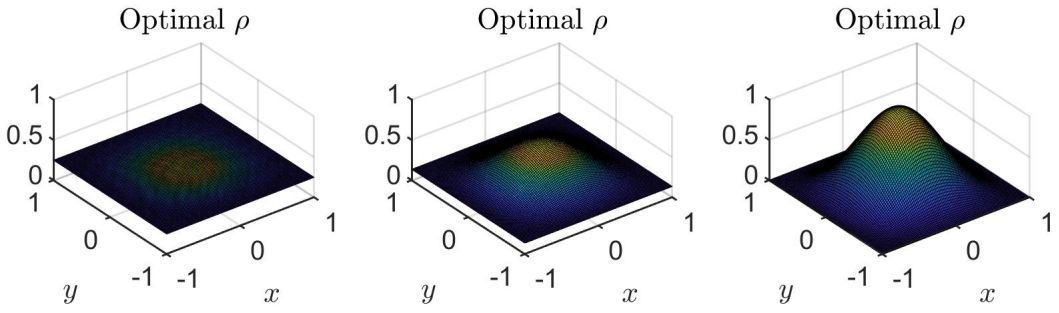

Figure 9: 2D Example 1, ρ optimal, $t = 2, 10, 20$, $\beta = 10^{-3}$, $\gamma = -1$