Christian Rowsell (40131393)

Mech 587 Project 2

Submitted to: Dr. Rajeev Jaiman

Contents

# Part 1: Unsteady Advection Equation

## Exact Solution

### Consider 1D advection equation How to classify it? How the solution behaves for this class of PDE?

This PDE will be classified as a hyperbolic equation. Therefore, this PDE will have a wave-like behaviour for the solution.

### Plot the initial contour of ϕ and velocity vector (u, v) with Matlab. Then convert the velocity vector from Cartesian coordinate system (u, v) to polar coordinate system (vr, vθ). Together with the answer of 1(a), can you write down the exact solution of the current problem?