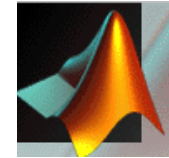


# Bemerkung 2.16: Lineare Gleichungen 1. Ordnung

$$u_t + cu_x = 0$$



see  
[plotchar.m](#)

## Charakteristiken

$$\dot{X}(t) = c$$

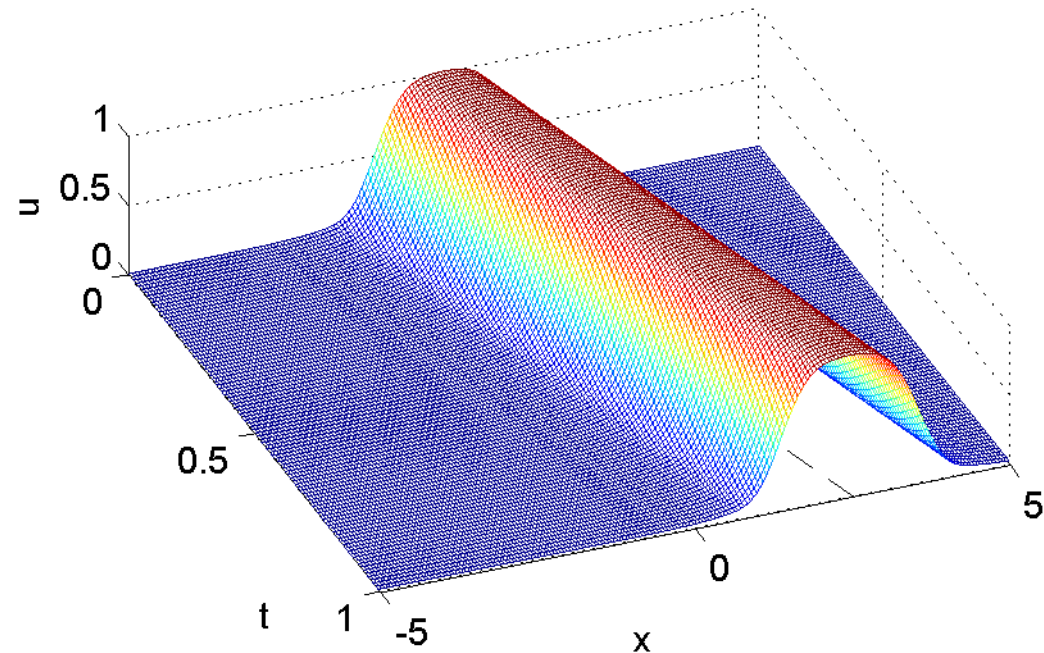
Allgemeine Lösung

$$u(x, t) = g(x - ct)$$

## Beispiel

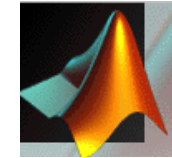
$$c = 2.5$$

$$u_t + cu_x = 0, \quad c = 2.50$$



# Beispiel 2.17: Die lineare Transportgleichung

$$u_t + c(x)u_x = 0$$



see  
[plotchar.m](#)

## Charakteristiken

$$\dot{X}(t) = c(X(t))$$

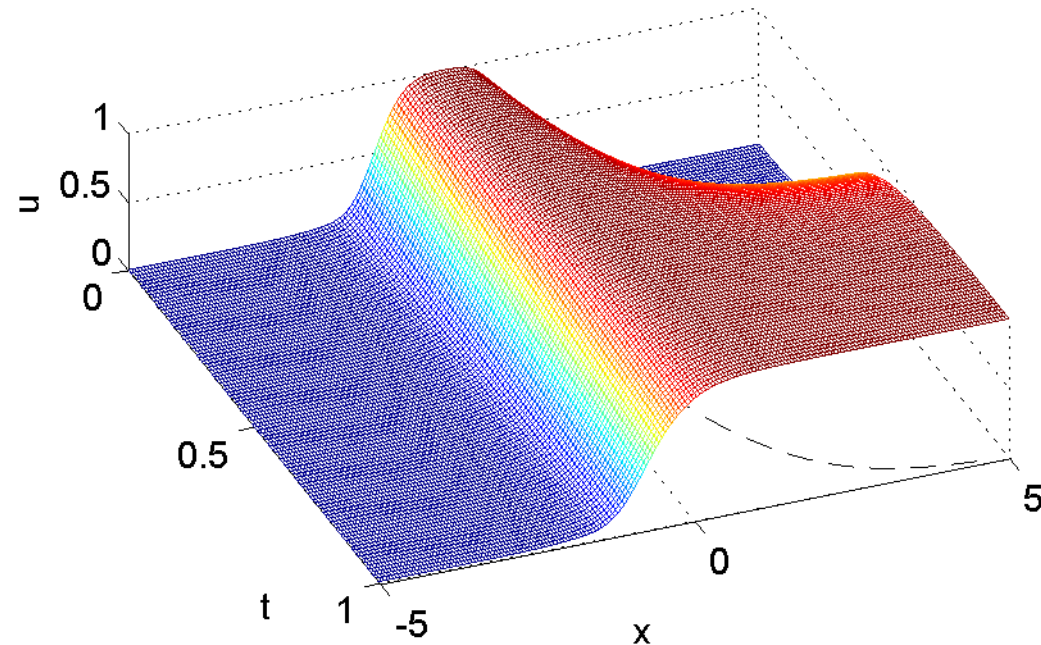
Allgemeine Lösung

$$u(x, t) = g(C(x) - t)$$

mit  $C'(x) = 1/c(x)$

Beispiel  $c(x) = e^x$

$$u_t + c e^x u_x = 0, \quad c = 1.00$$

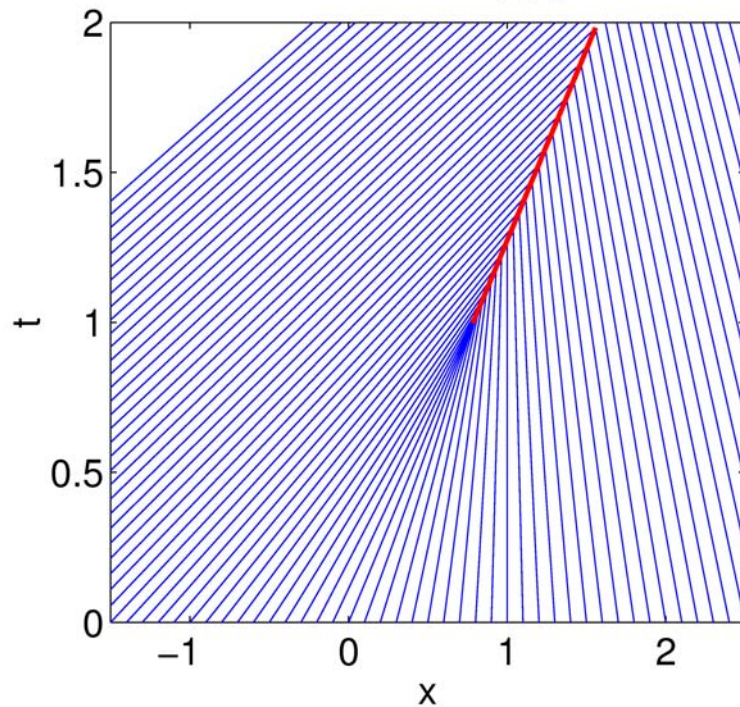


# Beispiel 2.18: Burgers-Gleichung

Quasilineare partielle Differentialgleichung 1. Ordnung

$$\frac{\partial u}{\partial t} + \frac{\partial}{\partial x} F(u) = 0$$

Charakteristiken fuer AB  $u(x,0) = \pi/4 - a \tan(x)$



Loesung der Burgers-Gleichung  $u_t + uu_x = 0$

