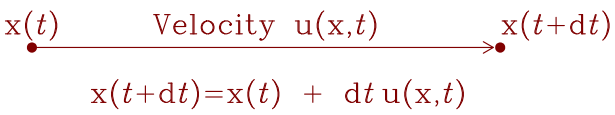

$$x(t+dt)=x(t) + dt\, u(x,t)$$

$$u(y,t)=u(x+y-x,t)$$
$$=u(x,t)+(y-x)\cdot\nabla u$$

$$y(t+dt)=y(t) + dt\, u(y,t)$$

Subtracting red from green:

$$s(t+dt)=s(t) + dt\, s\cdot\nabla u$$

where $s=y-x$