

## TD2 : Synthèse d'image

### Exercice 1:

#### Système de contraintes :

$C(t)$  de  $P_0$  à  $P_3$

$$C(t_0) = P_0 \quad C(t_1) = P_3$$

$$C'(t_0) = \vec{T}_0 \quad C'(t_1) = \vec{T}_3$$

#### Courbe paramétrique de degré 3:

Hermite, Bézier

$$x(t) = a_0 t^3 + b_0 t^2 + c_0 t + d_0$$

$$y(t) = a_1 t^3 + b_1 t^2 + c_1 t + d_1$$

$$z(t) = a_2 t^3 + b_2 t^2 + c_2 t + d_2$$

$$1) C(t) = at^3 + bt^2 + ct + d$$

$$2) C(t = 0) = P_0 = d$$

$$3) C(t = 1) = a + b + c + d = P_3$$

$$4) C'(t = 0) = 3at^2 + 2bt + c = c = \vec{T}_0$$

$$5) C'(t = 1) = 3at^2 + 2bt + c = 3a + 2b + c = \vec{T}_3$$

$$2) a + b + c + d = P_3 \Leftrightarrow a + b = P_3 - \vec{T}_0 - P_0$$

$$4) 3a + 2b + c = \vec{T}_3 \Leftrightarrow 3a + 2b = \vec{T}_3 - \vec{T}_0$$

$$2) 3a + 3b = 3(P_3 - \vec{T}_0 - P_0)$$

$$4) 3a + 2b = \vec{T}_3 - \vec{T}_0$$

$$2)-4) b = 3P_3 - 3\vec{T}_0 - 3P_0 - \vec{T}_3 + \vec{T}_0 = 3P_3 - 3P_0 - 2\vec{T}_0 - \vec{T}_3$$

$$a = P_3 - \vec{T}_0 - P_0 - b = P_3 - \vec{T}_0 - P_0 - (3P_3 - 3P_0 - 2\vec{T}_0 - \vec{T}_3) = P_3 - \vec{T}_0 - P_0 - 3P_3 + 3P_0 + 2\vec{T}_0 + \vec{T}_3$$

$$a = -2P_3 + 2P_0 + \vec{T}_0 + \vec{T}_3$$

$$C(t) = at^2 + bt^2 + ct + d$$

$$uv = u'v - uv' \quad u^n = nu'u^{n-1}$$

