

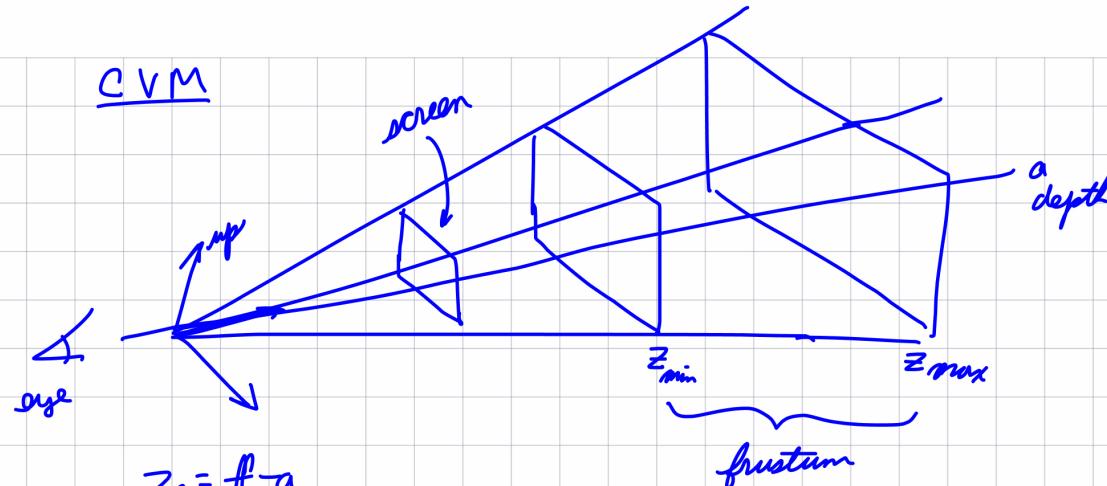
$$\mathbf{r}' = \|\mathbf{r}\| + t\mathbf{d}l = \begin{pmatrix} x' \\ y' \\ z' \end{pmatrix} = \begin{pmatrix} x \\ y \\ z \end{pmatrix} + t \begin{pmatrix} dx \\ dy \\ dz \end{pmatrix}$$

$$\begin{aligned} y' &= 3 = t \frac{dy}{dx} + y \\ x' &= x + t \frac{dx}{dz} \\ z' &= z + t \frac{dz}{dx} \end{aligned}$$

$$\frac{3-y}{dy} = t$$

$$\begin{pmatrix} x' \\ y' \\ z' \end{pmatrix} = \begin{pmatrix} x \\ y \\ z \end{pmatrix} + \begin{pmatrix} \frac{3-y}{dy} dx \\ 3-y \\ \frac{3-y}{dy} dz \end{pmatrix}$$

CVM

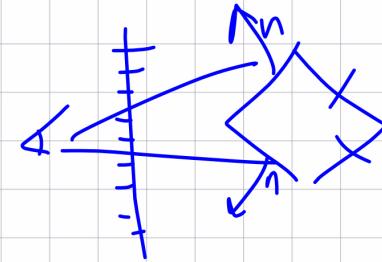


$$z_e = f - a$$

$$y \propto z_e \rightarrow [x_e]$$

$$x_e \propto z_e = [y]$$

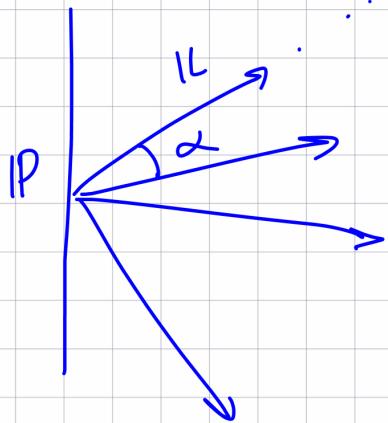
\Rightarrow world to eye
the clip polygons



$$n \cdot v \leq 0 \rightarrow \text{invisible}$$



Phong



$$I_p = K_a \text{ ambient} + K_d \text{ diffuse} + K_s \text{ specular}$$

$$= K_a I_a + \frac{I_L}{\|A_{ip}\|} c (K_d \cdot \cos(\alpha) + K_s \cos(\beta))$$

3 special cases:

- ① if light, viewer on opposite sides of obj
⇒ only ambient

- ② if light, viewer on same side
 $n \cdot L > 0$, outside color
 $n \cdot L < 0$, inside color

- ③ if light, viewer on same side
 $n \cdot V < 0 \rightarrow$ no specular