

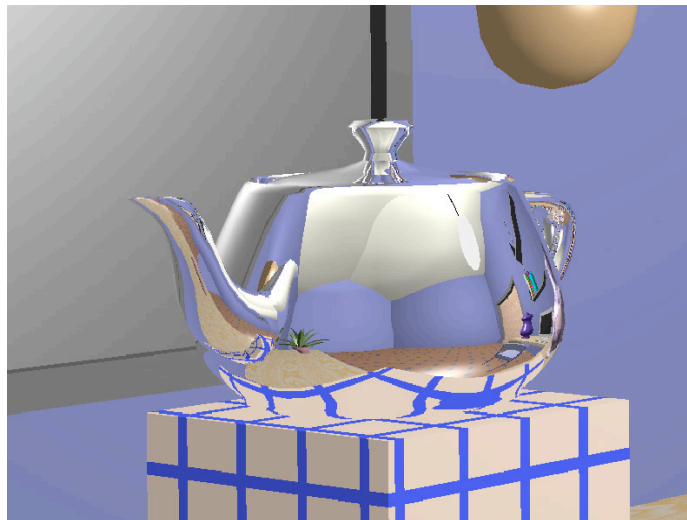
References

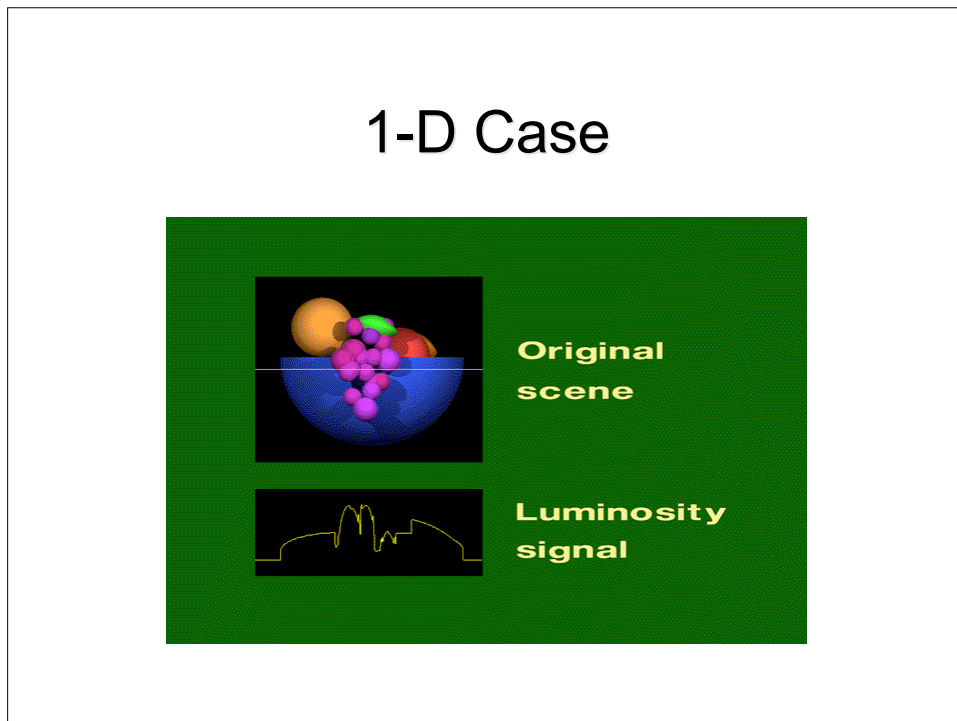
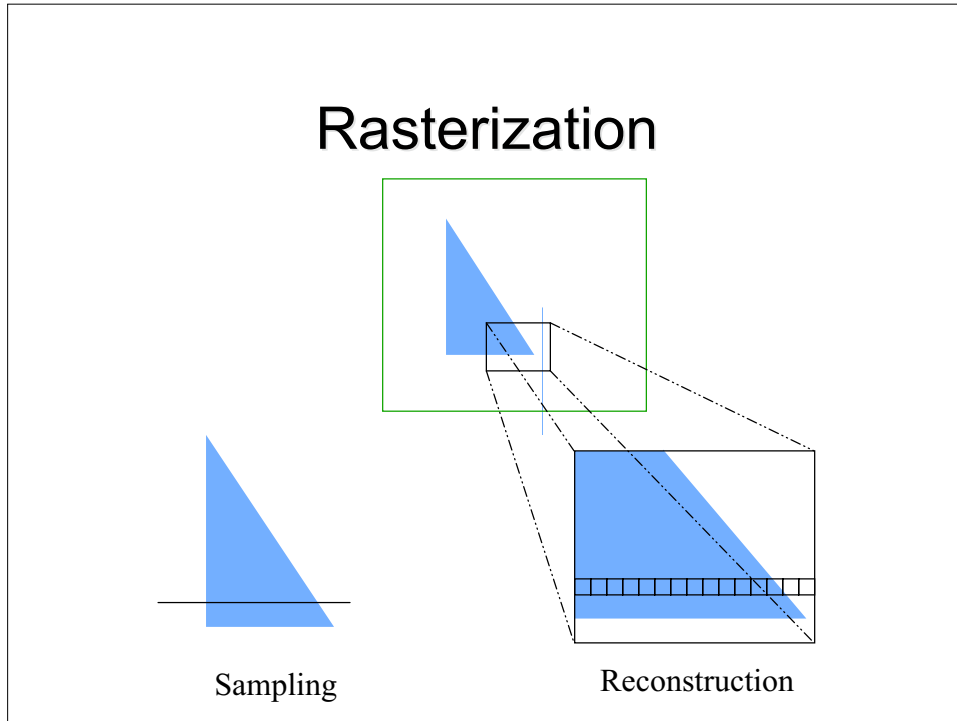
- Alan Watt, “**3D computer graphics**” chapter 14
- Jonas Gomes and Luiz Velho, “**Image processing for computer graphics**” book, Springer-Verlag New York, 1997 chapter 7
- Jim Blinn, “**Return of the Jaggy** ” IEEE Computer Graphics and Applications journal, Mar 1989, vol 9, issue 2
- Jim Blinn, “**What we need around here is more aliasing** ” IEEE Computer Graphics and Applications journal, Jan 1989, vol 9, issue 1
- Images: Siggraph 1993

Aliasing

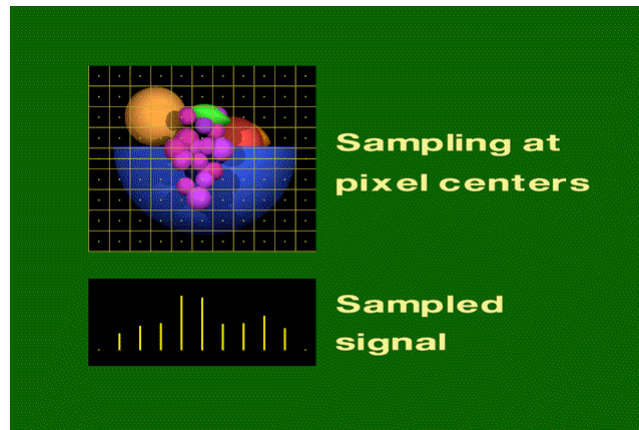


Aliasing in Ray tracing

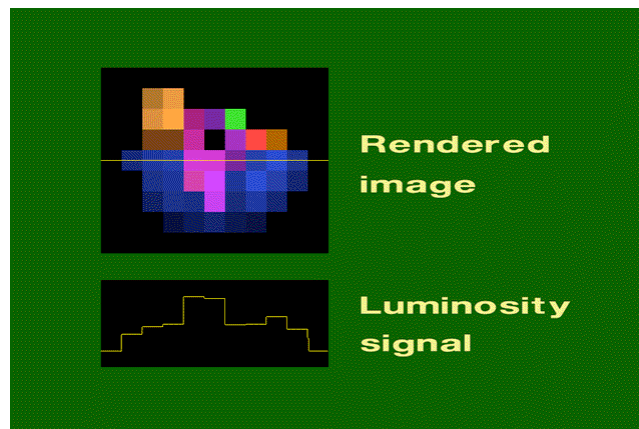


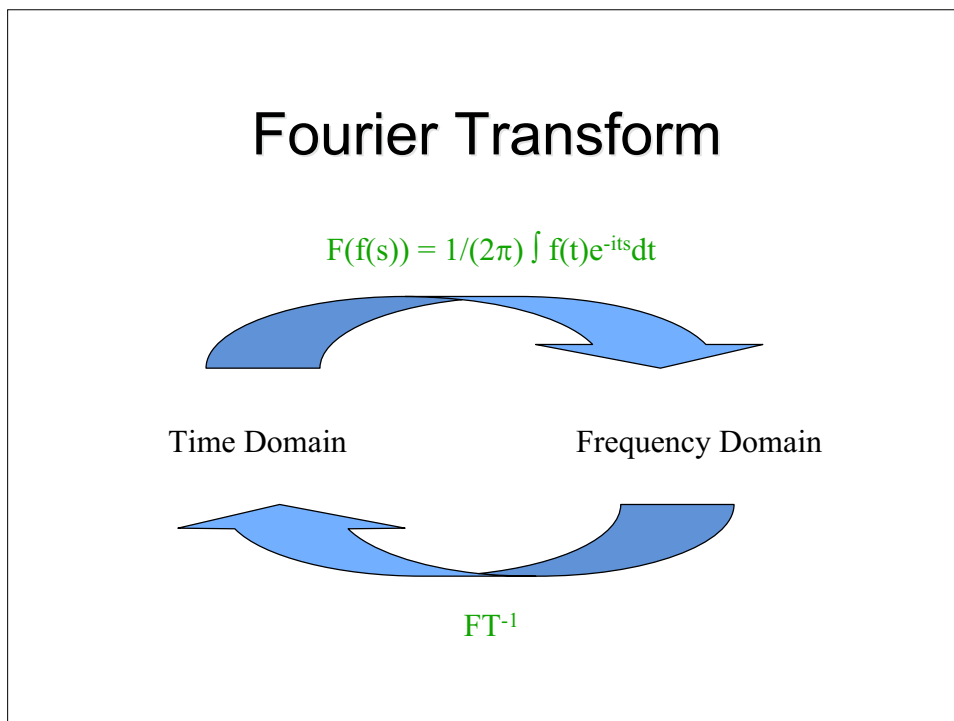
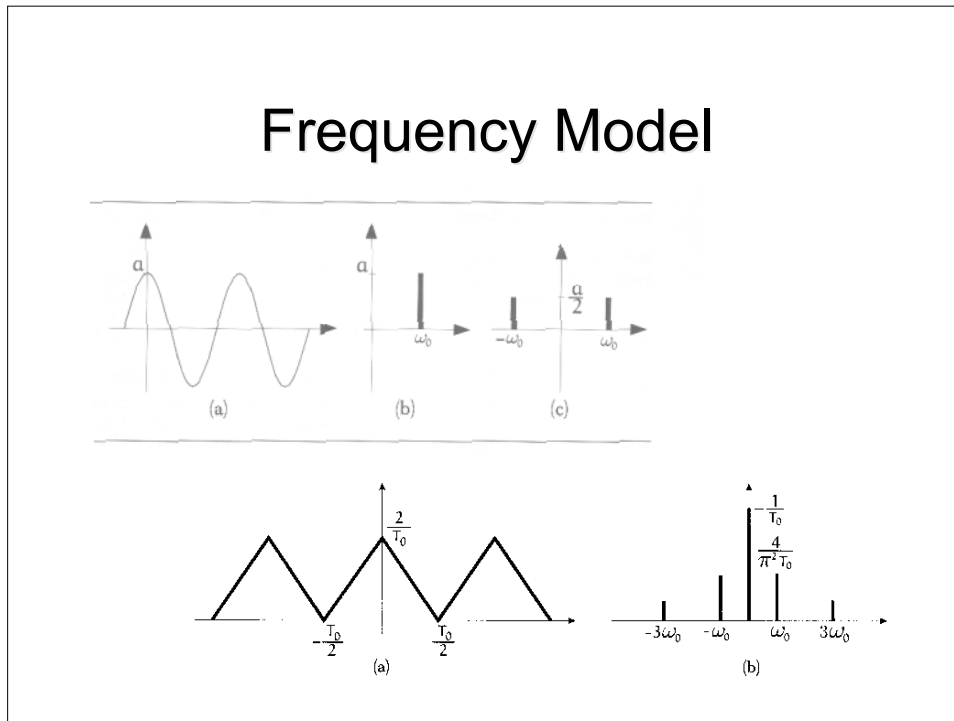


1-D Sampling



1-D Reconstruction





Interesting Functions

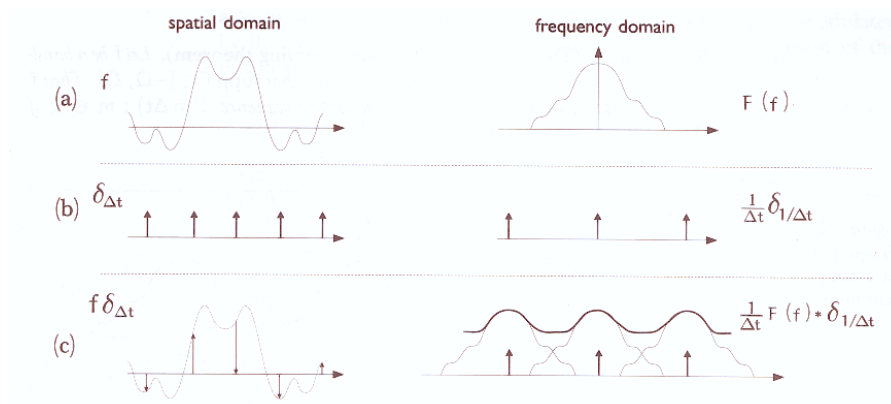
- FT of a comb function is another comb

$$F(\text{comb}_T(t)) = \frac{1}{T} \text{comb}_{1/T}(f)$$

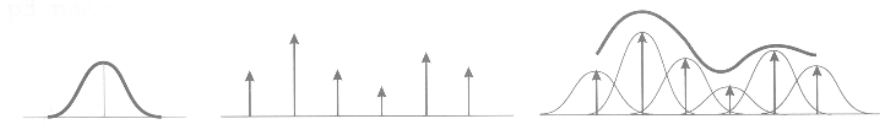
- FT of box function is sinc function

$$\text{sinc}(x) = \begin{cases} \sin(x) / x, & x \neq 0 \\ 1, & x = 0 \end{cases}$$

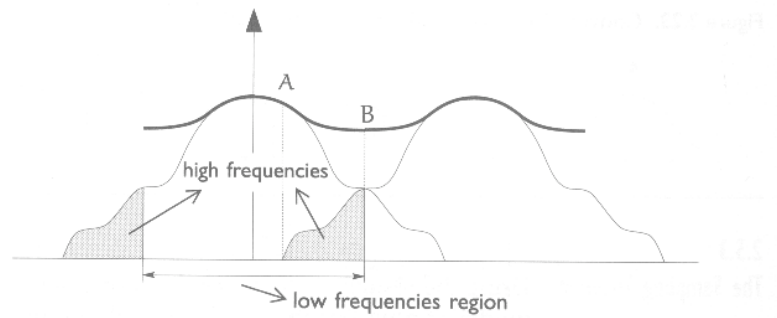
Sampling



Reconstruction

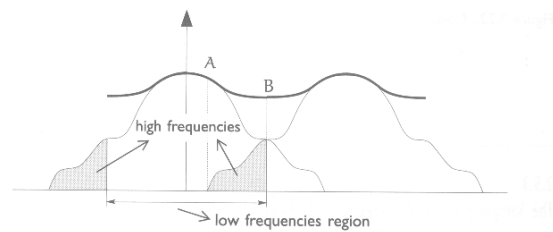


Aliasing



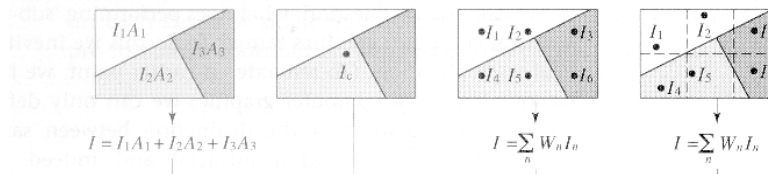
Anti-aliasing

- Sample at twice the higher frequency
 - Limit the highest frequency
- Low pass filter



Anti-aliasing

- Pre-filtering — no sampling
- No filtering — one sample per pixel
- Post filtering — uniform
- Post filtering — jittered



Pre-filtering

- Area sampling method
- Continuous image divided into small squares
- Clip polygons against square boundaries
- Final intensity = shade * visible area
- Original implementation very expensive

Supersampling

- Calculate a virtual image at higher resolution
- Average it down to lower resolution
- Easy to implement
- Increase z-buffer memory
- Not suitable for small objects

Non-uniform Sampling



Example A

Example B

Jagged Edges

- [Alias?](#)
- [Jaggies](#)

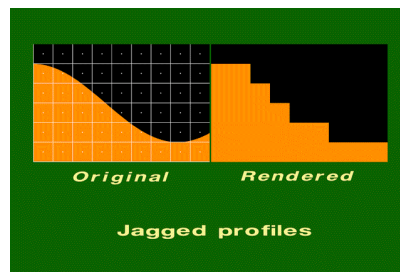


Image Study

