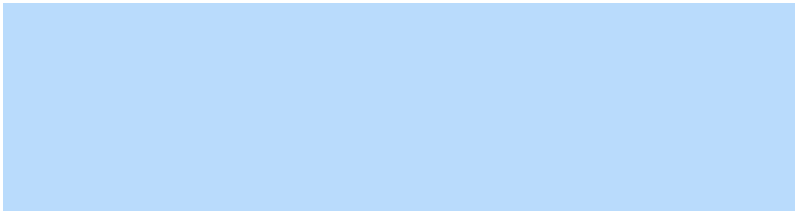


Dingzeyuuli

 COLUMBIA COMPUTER GRAPHICS GROUP 

Oct 24, 2017



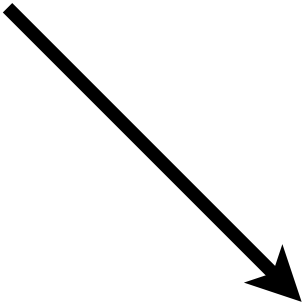


Multi-Layer Profile

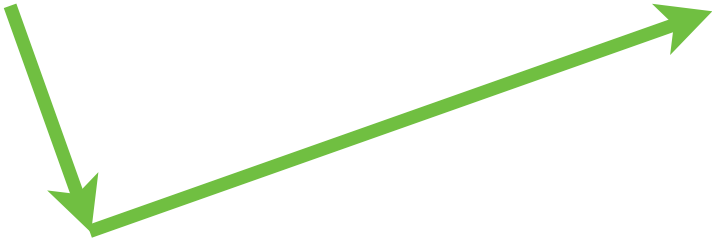
2

3









$$R(d) = R_1 + T_1 R_2 T_1 + T_1 R_2 R_1 R_2 T_1 + \cdots$$

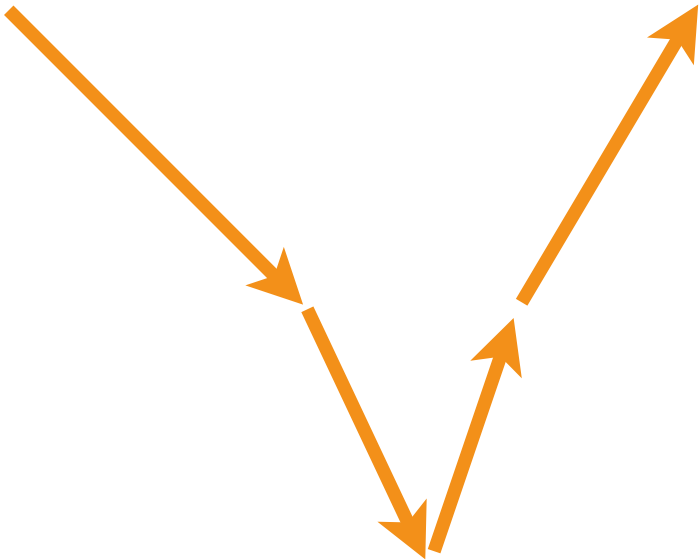
$$= R_1 + T_1 R_2 T_1 (1 + R_1 R_2 + (R_1 R_2)^2 + \cdots)$$

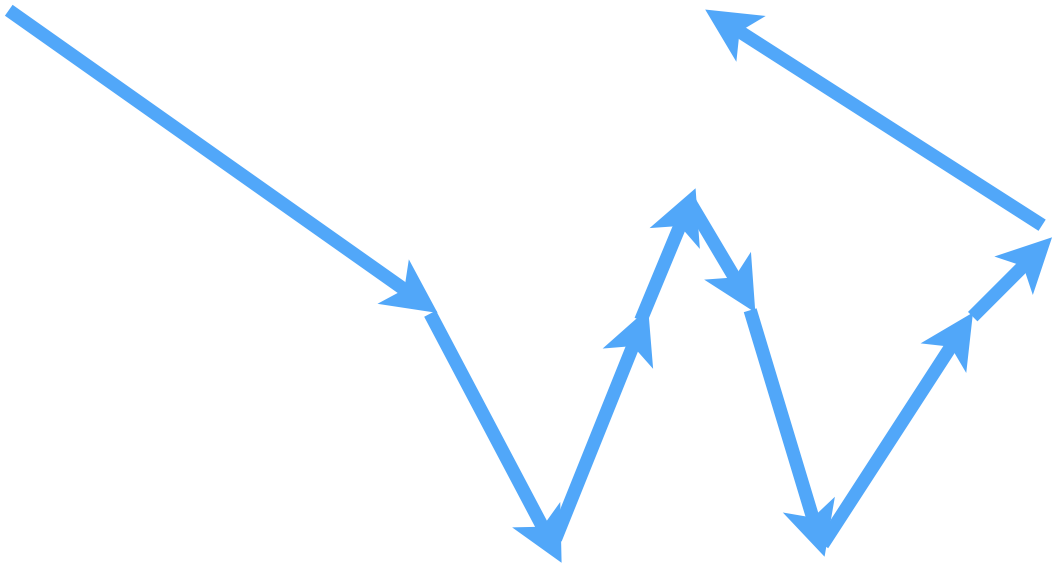
$$= R_1 + \frac{T_1 R_2 T_1}{1 - R_1 R_2}$$

0-bounce

1-bounce

2-bounce





Efficient computation for layered materials

$$R(d) \quad \&= \quad R_1 + T_1 R_2 T_1 + T_1 R_2 R_1 R_2 T_1 + \backslash cdots \quad \backslash \backslash$$

$$\&= R_1 + T_1 R_2 T_1 (1 + R_1 R_2 + (R_1 R_2)^2 + \backslash cdots) \backslash \backslash$$

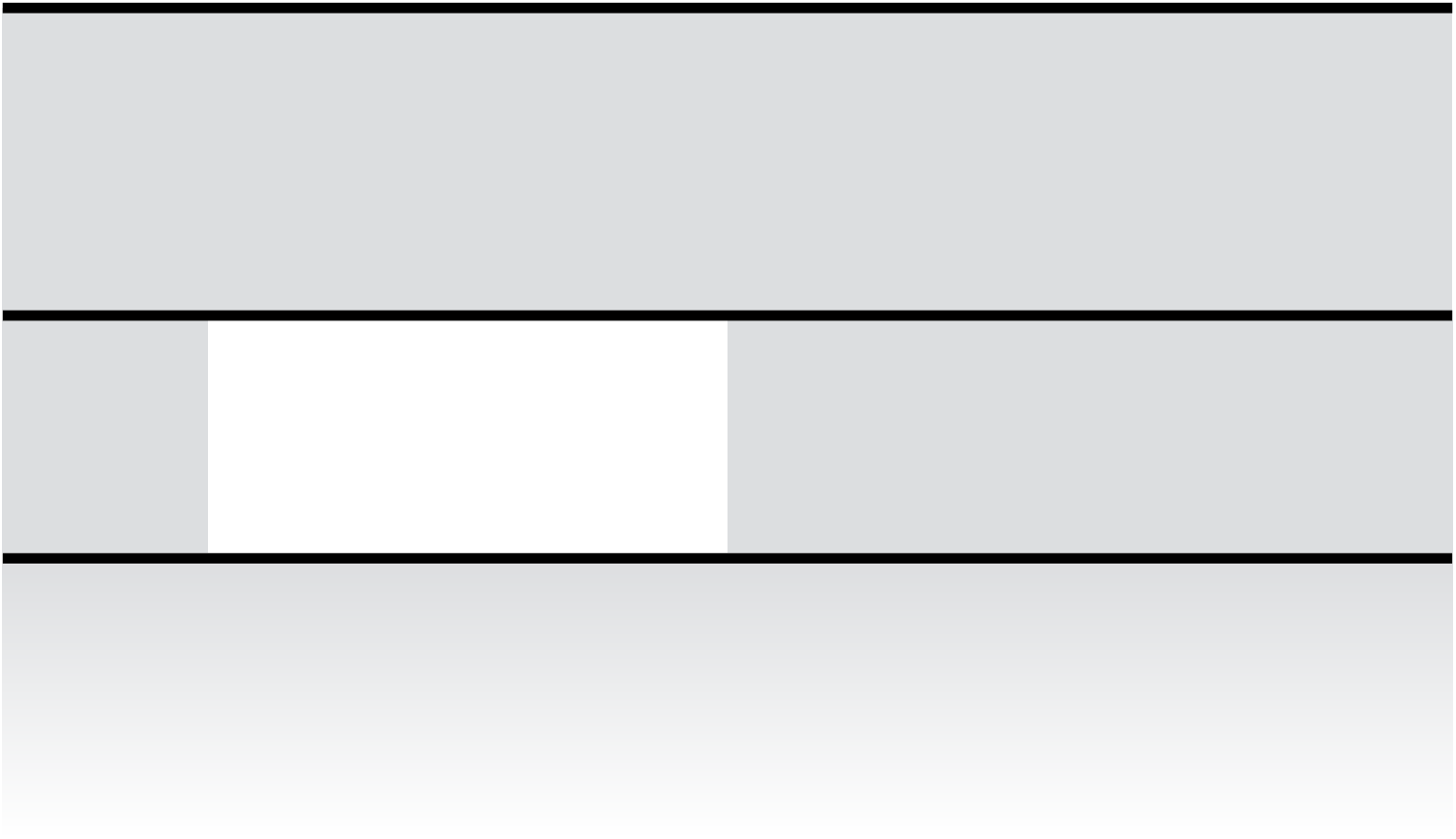
$$\&= R_1 + \backslash frac{T_1 R_2 T_1}{1 - R_1 R_2}$$

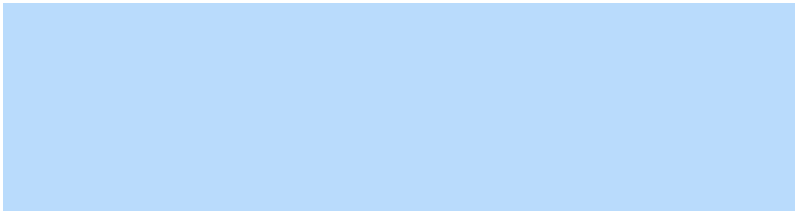


[Danner and Jensen, SIGGRAPH 2005]

$$R_1(d), I_1(d)$$

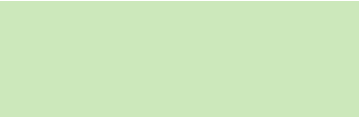
$$R_2(d), I_2(d)$$





Putting it together

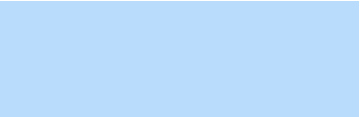




0-knowledge



1-to-1000000



2-knowledge

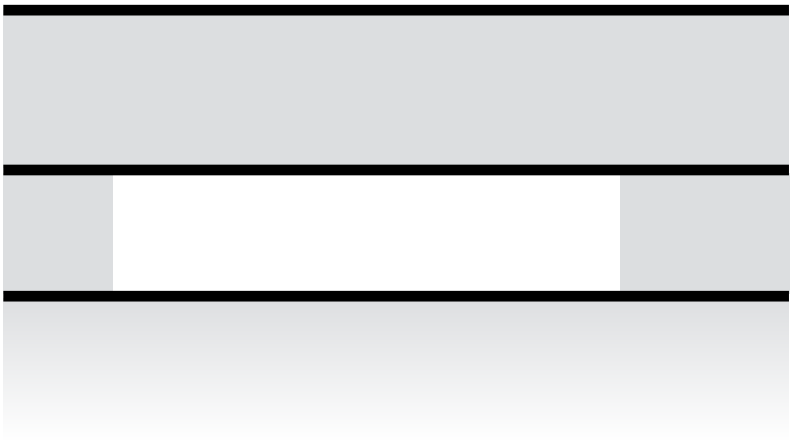
$$R(d) = R_1 + T_1 R_2 + T_1 R_2 R_1 + T_1 R_2 R_1 T_1 + \dots$$

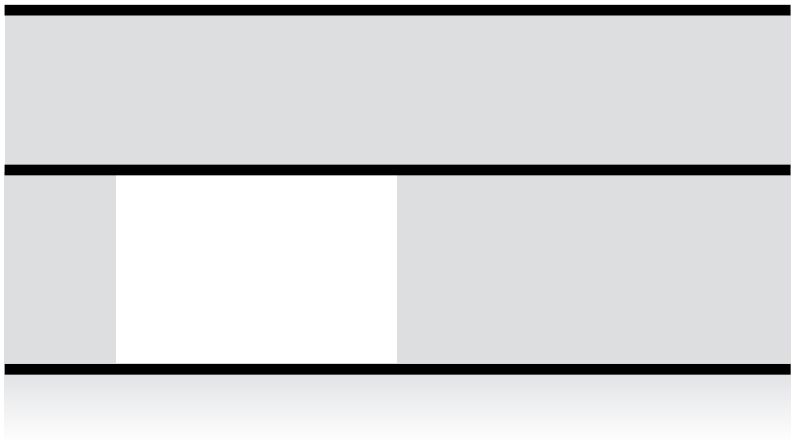


$$R = \frac{R_1 + T_1 R_2 + T_1 (R_1 R_2 + R_1 R_2 + \dots)}{N}$$

$$z = R_1 + \sqrt{\frac{1}{R_2}} \{T_1 R_2 T_1\} \{1 - R_1 R_2\}$$



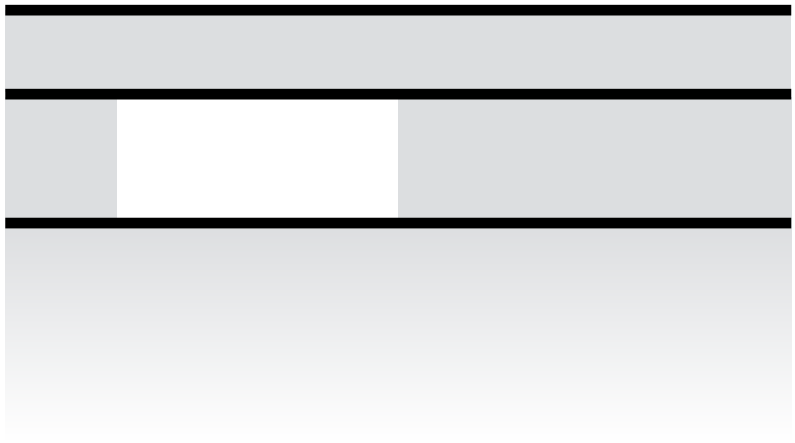












2

4

