Dingzeyu Li

Oct 24, 2017

Multi-Layer Profile

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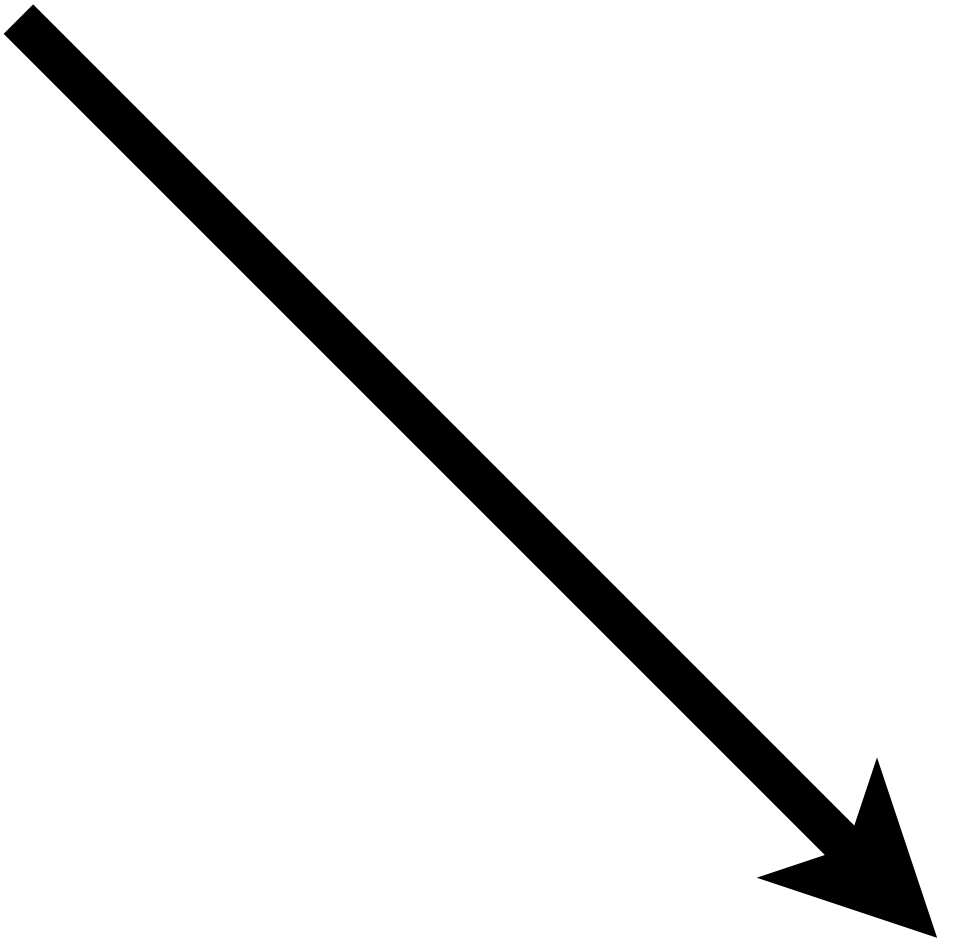
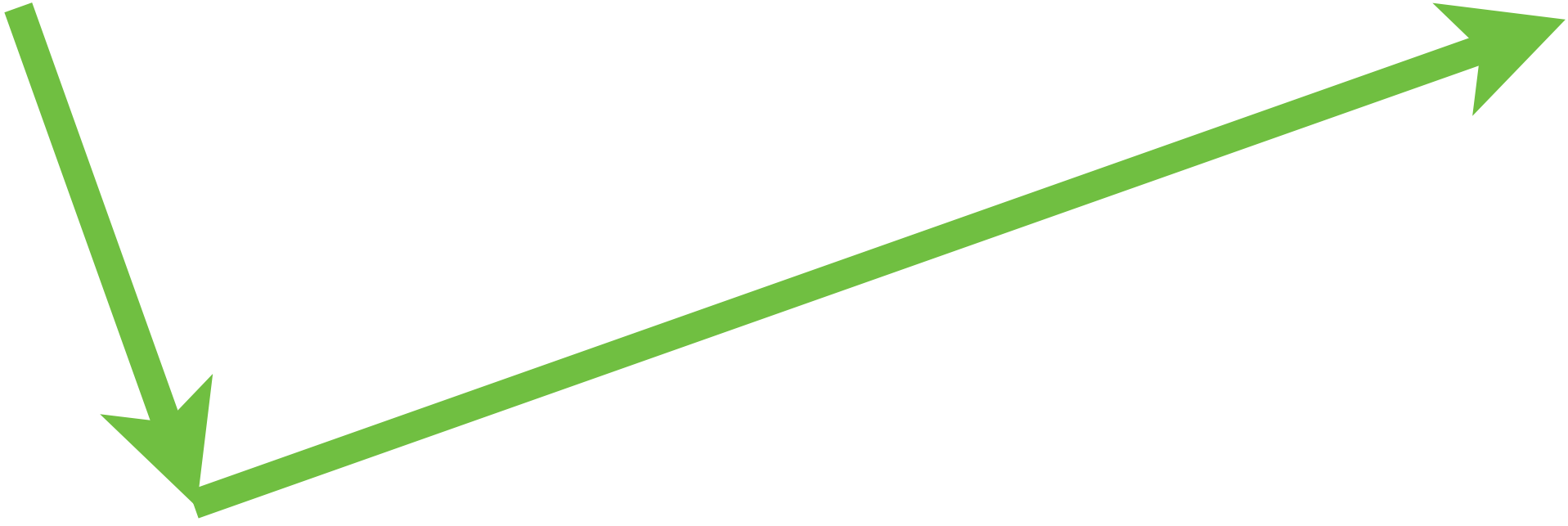




$$R(d) = R_1 + T_1 R_2 T_1 + T_1 R_2 R_1 R_2 T_1 + \cdots$$

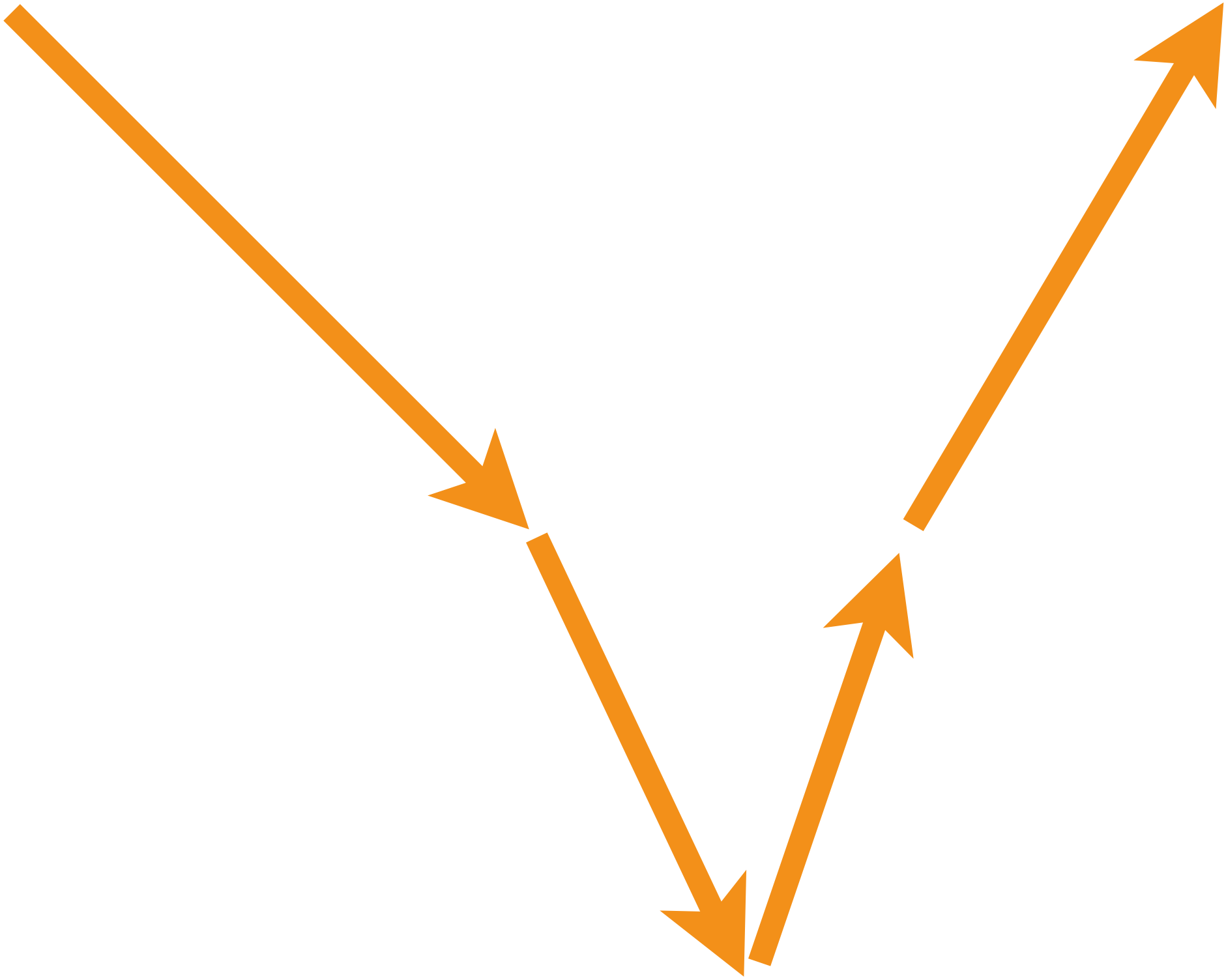
$$= R_1 + T_1 R_2 T_1 (1 + R_1 R_2 + (R_1 R_2)^2 + \cdots)$$

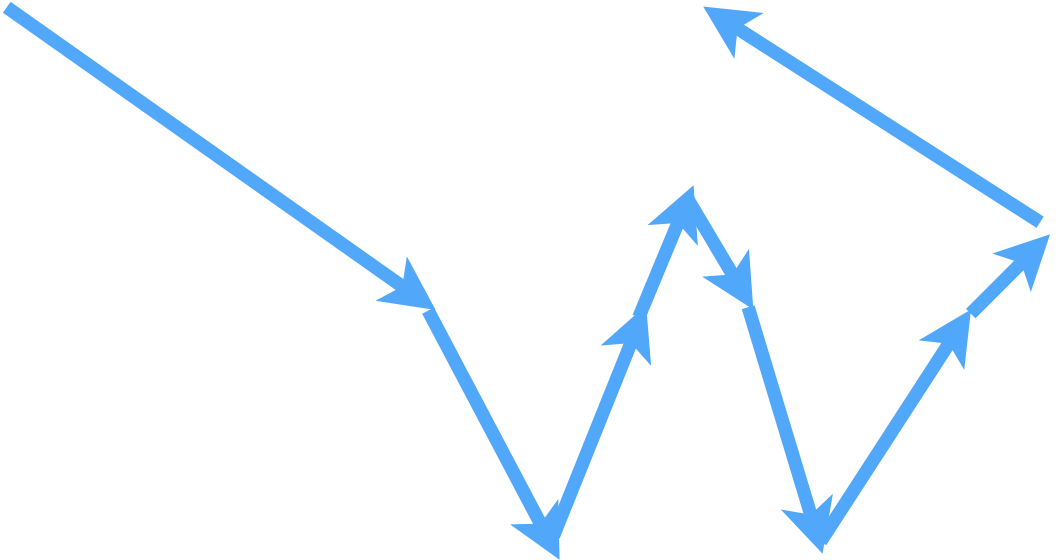
$$= R_1 + \frac{T_1 R_2 T_1}{1 - R_1 R_2}$$

0-bounce

1-bounce

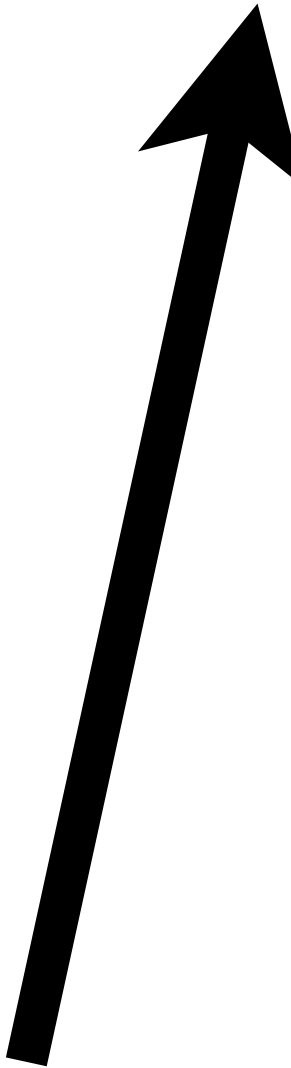
2-bounce





Efficient computation for layered material

$$
\begin{aligned}
R(d) &= R_1 + T_1 R_2 T_1 + T_1 R_2 R_1 R_2 \ T_1 + \cdots \ \\
\\
&= R_1 + T_1 R_2 T_1 (1 + R_1 R_2 + (R_1 R_2)^2 + \cdots)\\
&= R_1 + \frac{T_1 R_2 T_1}{1 - R_1 R_2}
\end{aligned}
$$



[Donner and Jensen, SIGGRAPH 2005]

$$R_1(d), T_1(d)$$

$R_2(d), T_2(d)$

Putting it together

0-bounce

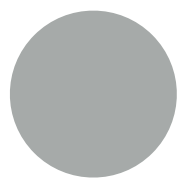
1-bounce

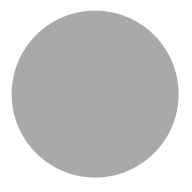
2-bounce

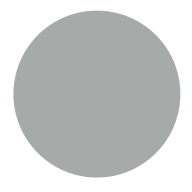
$$
\begin{aligned}
R(d) &= R_1 + T_1 R_2 T_1 + T_1 R_2 R_1 R_2 \ T_1 + \cdots \\
\end{aligned}
$$

$$
\begin{aligned}
&= R_1 + T_1 R_2 T_1 (1 + R_1 R_2 + (R_1 R_2)^2 + \cdots)\\

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







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