Caustics in forward path tracing

Shawn Halayka*

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Abstract

In this paper we introduce a method for producting caustics in forward path tracing. These caustics do not rely on a light location, and as such, do not rely on bidirectional or backward path tracing.

1 Introduction

*sjhalayka@gmail.com

```
vec3 hitPos = o + d * rayPayload.distance;

// If partially transparent
if(rayPayload.opacity != 1.0)
{
    // Incoming ray
    if(dot(d, rayPayload.normal) <= 0.0)
    {
        o = hitPos.xyz - rayPayload.normal * 0.01f;
        d = refract(d, rayPayload.normal, eta);
    }
    else // Outgoing ray
    {
        vec3 temp_dir = refract(d, -rayPayload.normal, 1.0/eta);

        if(temp_dir != vec3(0.0))
        {
            o = hitPos.xyz + rayPayload.normal * 0.01f;
            d = temp_dir;
        }
        else
        {
            // Total internal reflection
            o = hitPos.xyz - rayPayload.normal * 0.01f;
            d = reflect(d, -rayPayload.normal);
        }
    }
}
else // Fully opaque
{
    o = hitPos + rayPayload.normal*0.01;
    d = cosWeightedRandomHemisphereDirection(rayPayload.normal, prng_state);
}
```

Figure 1: Taking into consideration transparent objects. In essence, instead of always producing a pseudorandom cos-weighted reflection vector, refraction occurs for transparent objects.

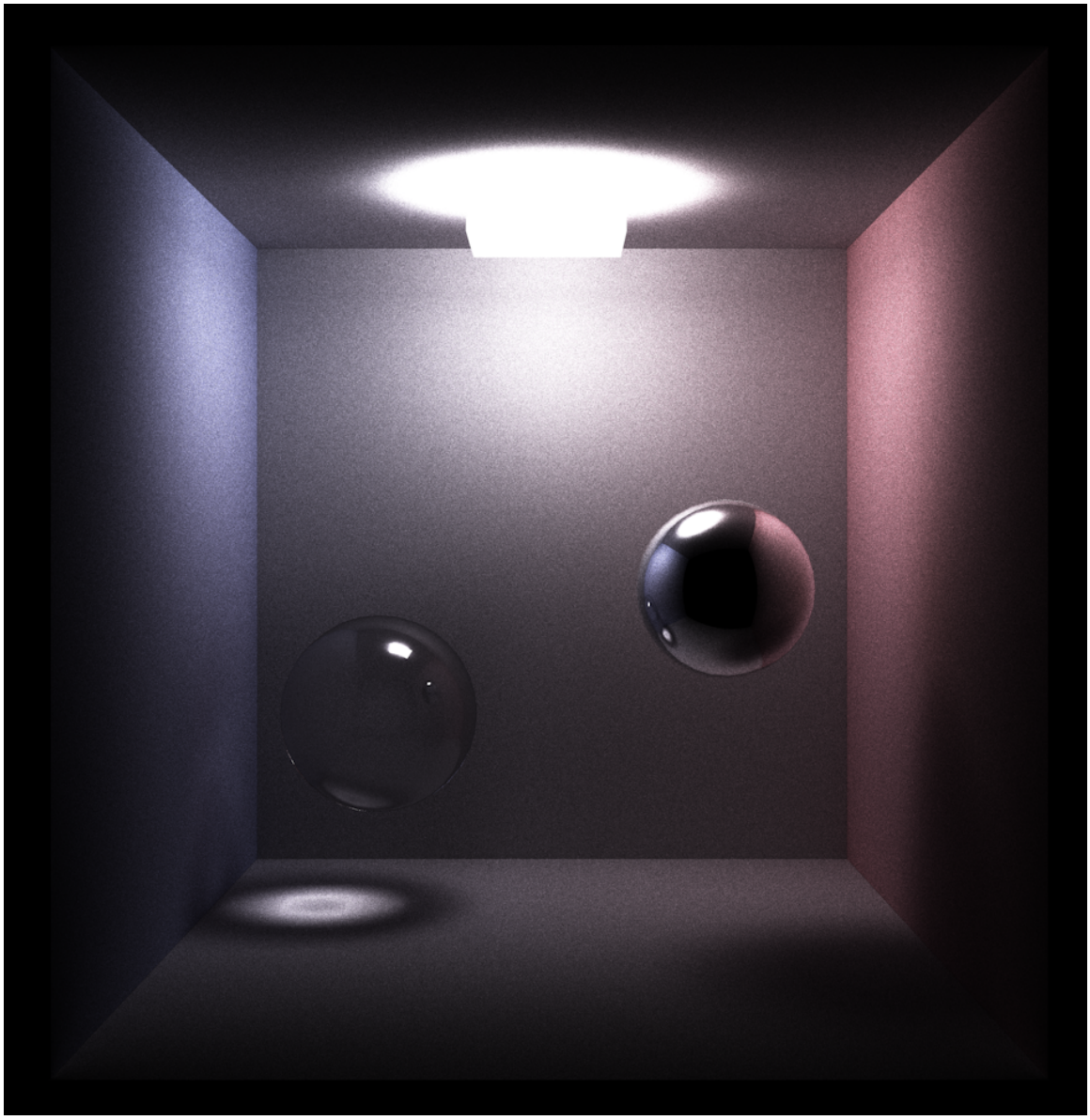

Figure 2: Caption...

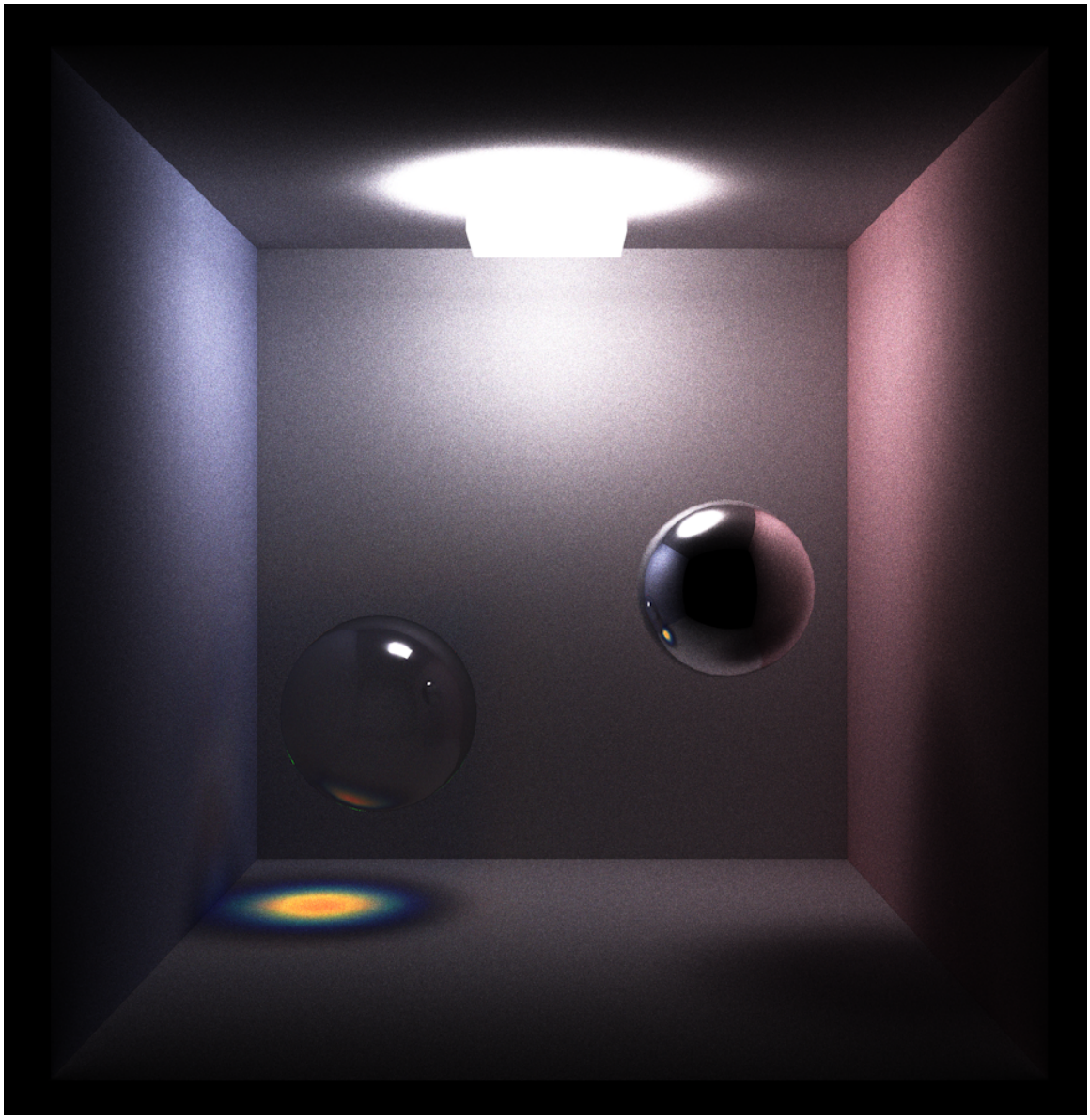

Figure 3: Caption...

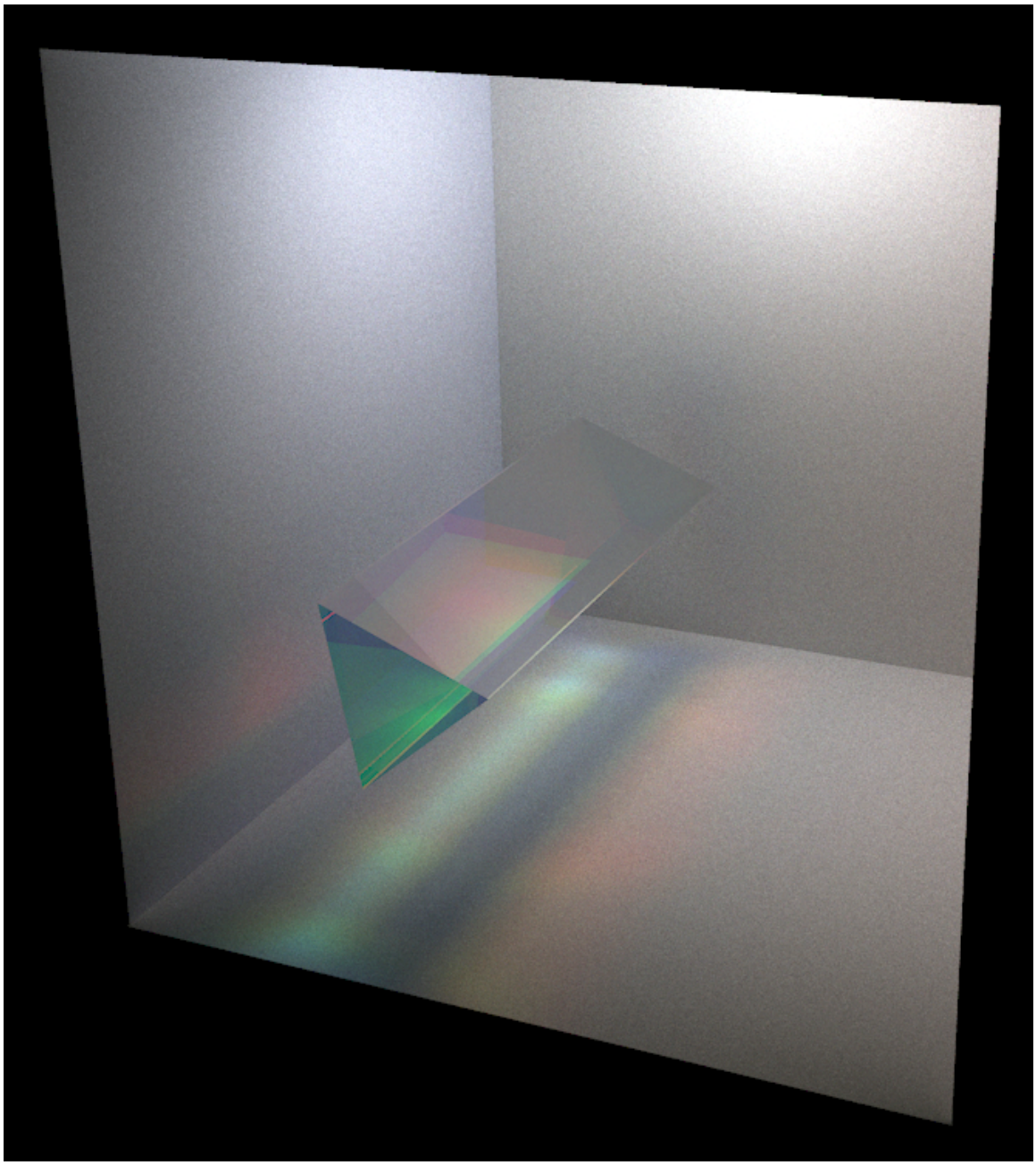

Figure 4: Caption...

References

[1] Fatou. Sur les équations fonctionnelles. 1919