

Material Modelling

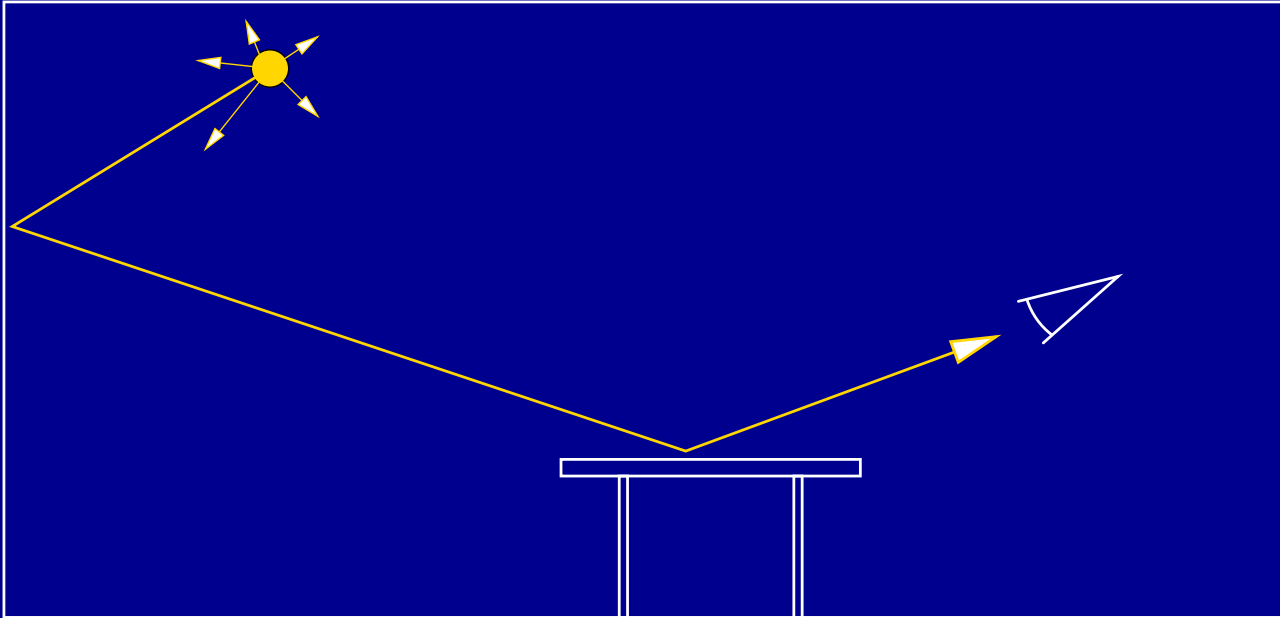
Radiance Workshop, Fribourg, 30.9–1.10.2002

Dr. Peter Apian–Bennewitz

<http://www.pab-opto.de/radiance>

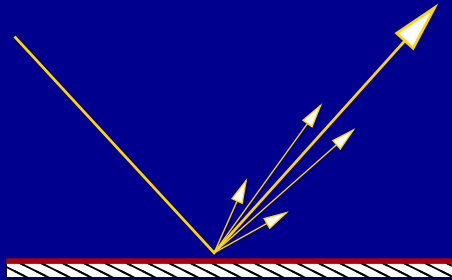
core elements of light simulation:

- finding all light paths
- lamp & material models



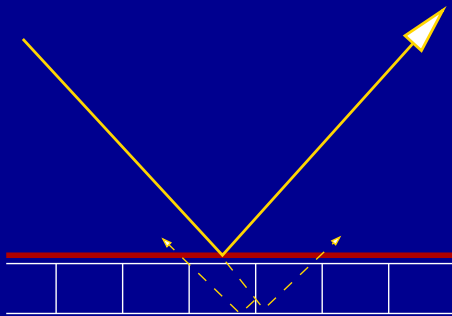
material models:

- models for real surfaces



example: aluminium sample

- models to hide complex geometry



example: roof material

Example: Parameters for Standard Material

- standard material

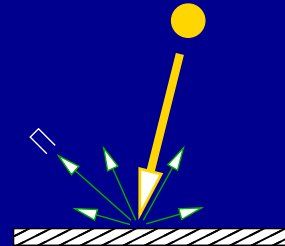
```
void metal m1
0
0
5 0.857 0.857 0.857 1 0.497
```

- measurements

angular-dependant

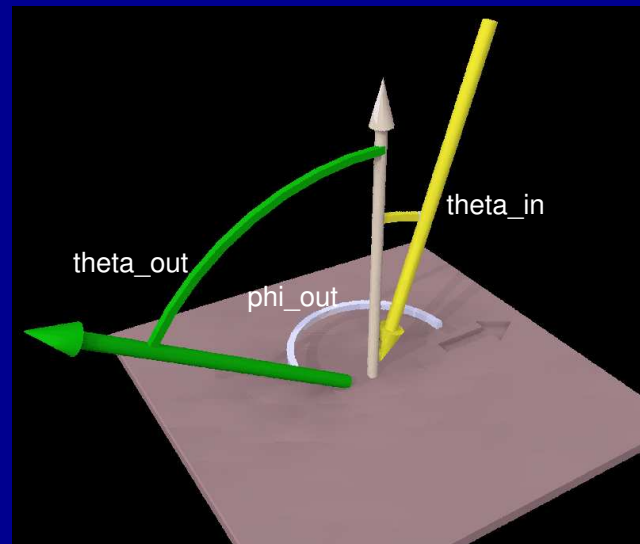
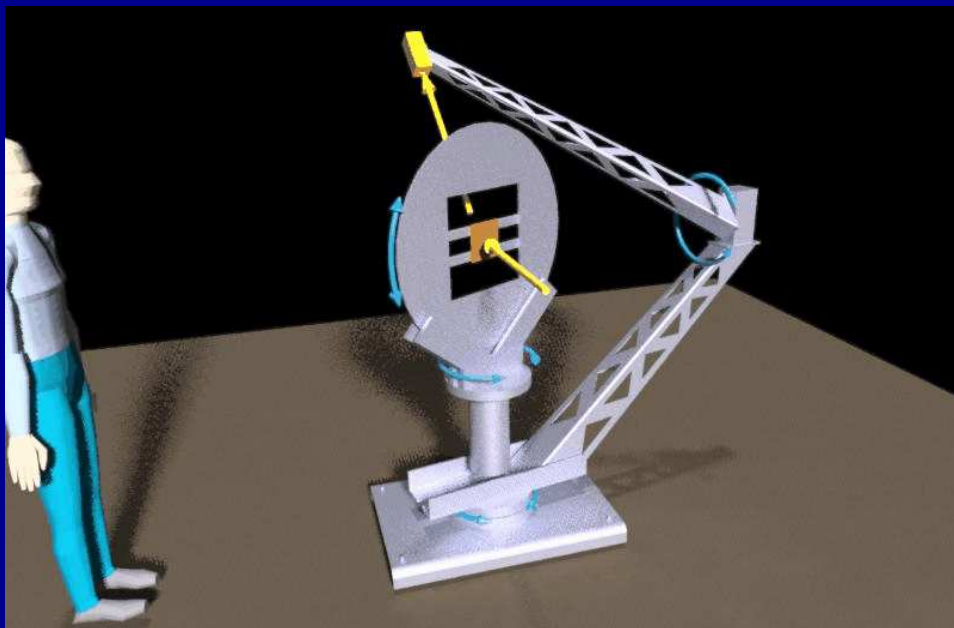
wavelength-dependant

fitting of parameters to measured data



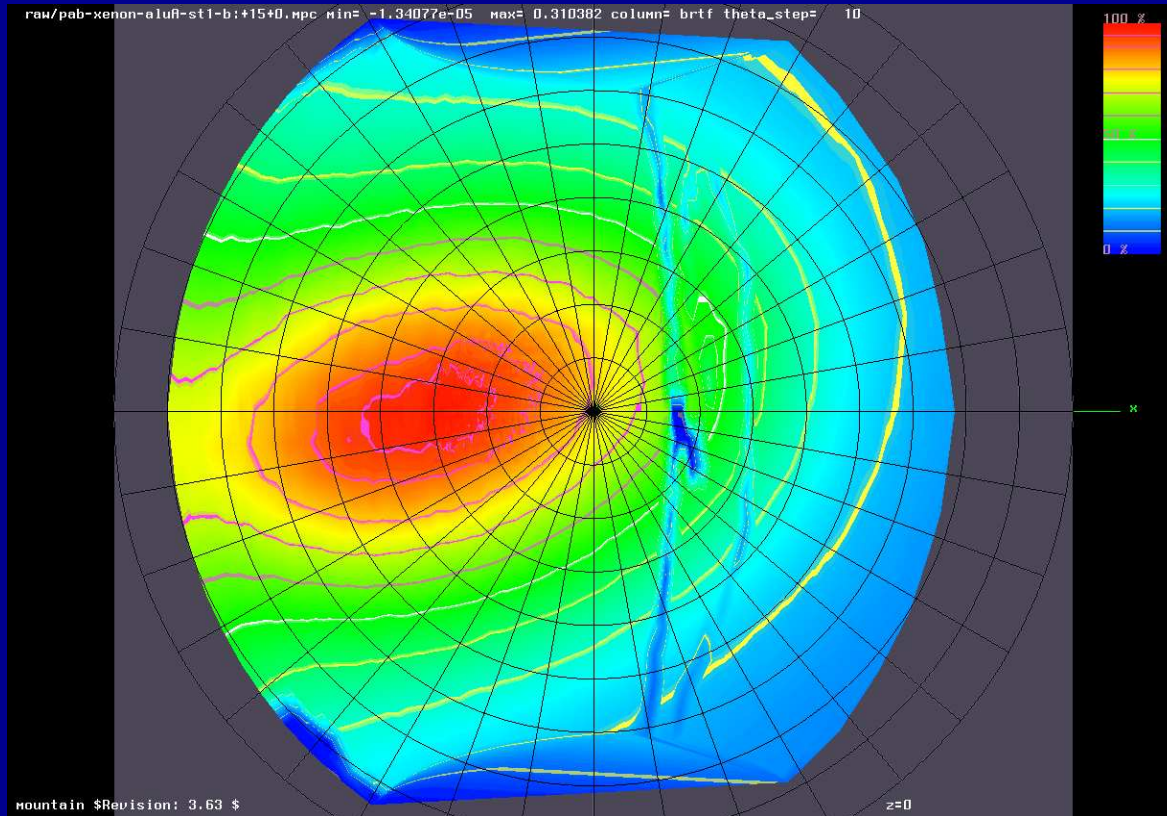
Example: Sandblasted Aluminium Surface

- measuring reflection data (BRDF)



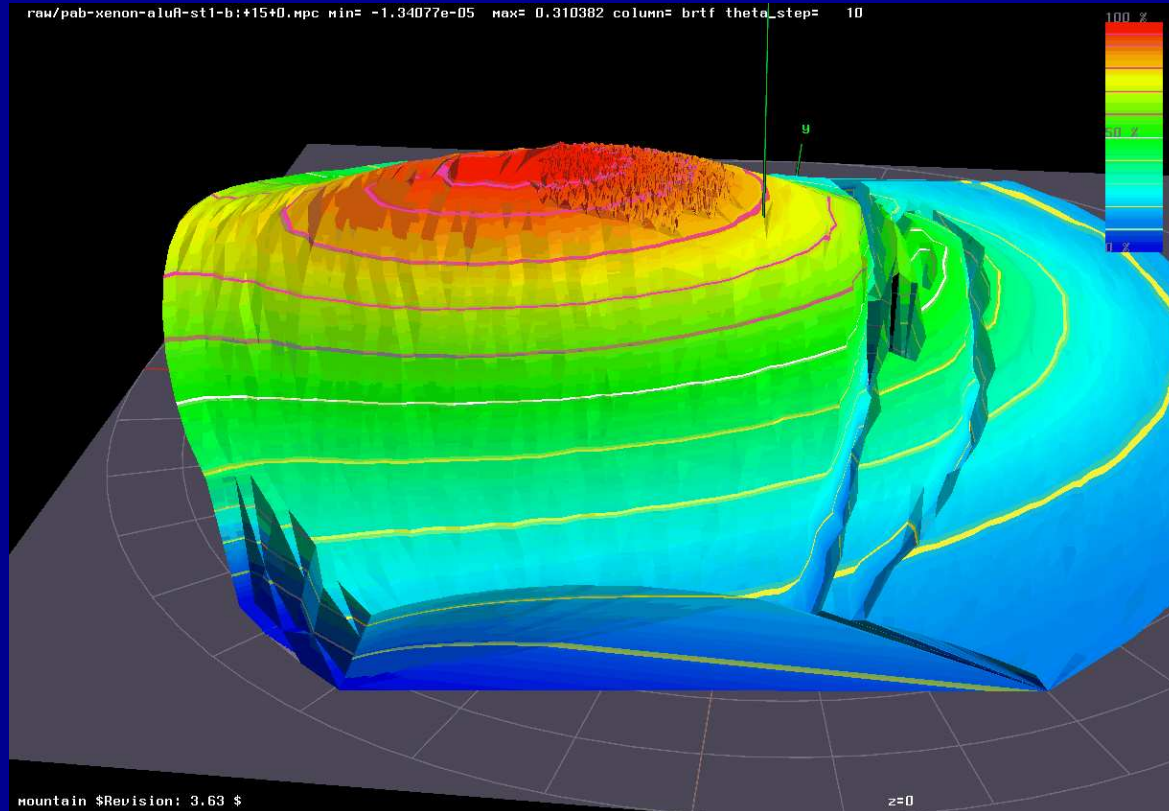
Example: Sandblasted Aluminium Surface

- visualisation of reflection data (BRTF)



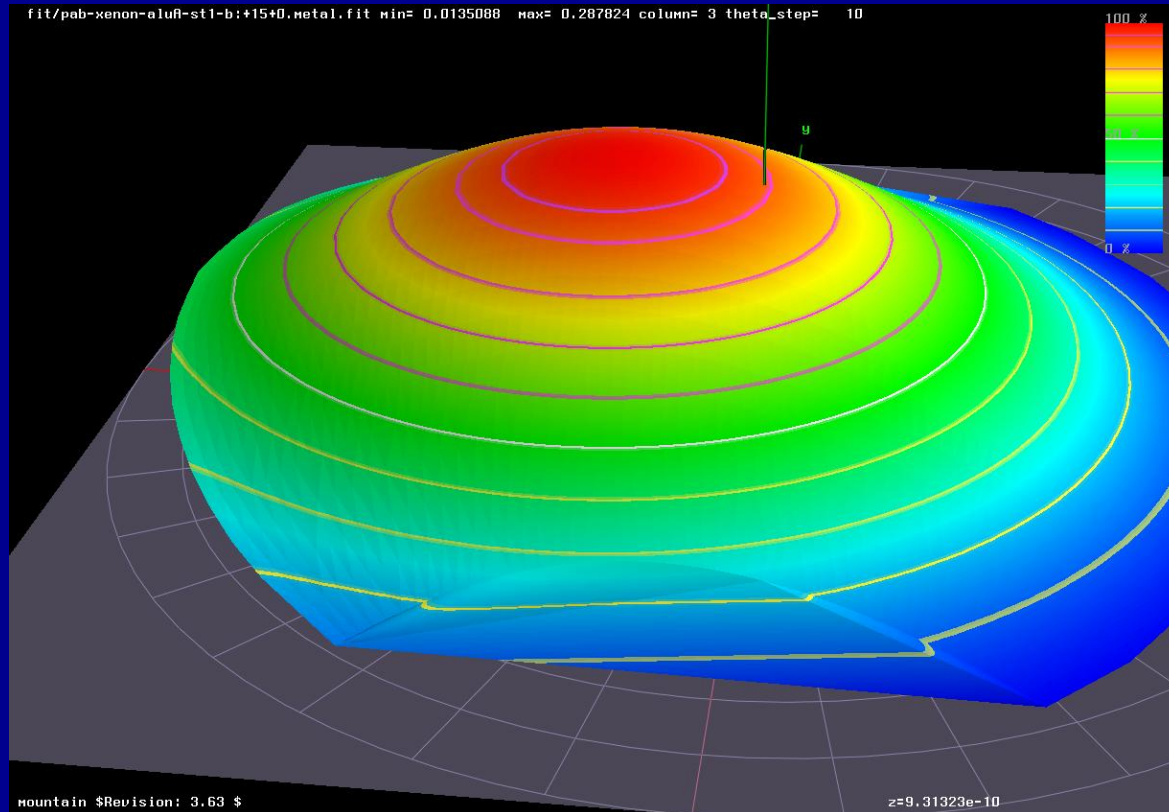
Example: Sandblasted Aluminium Surface

- visualisation of reflection data (BRTF)



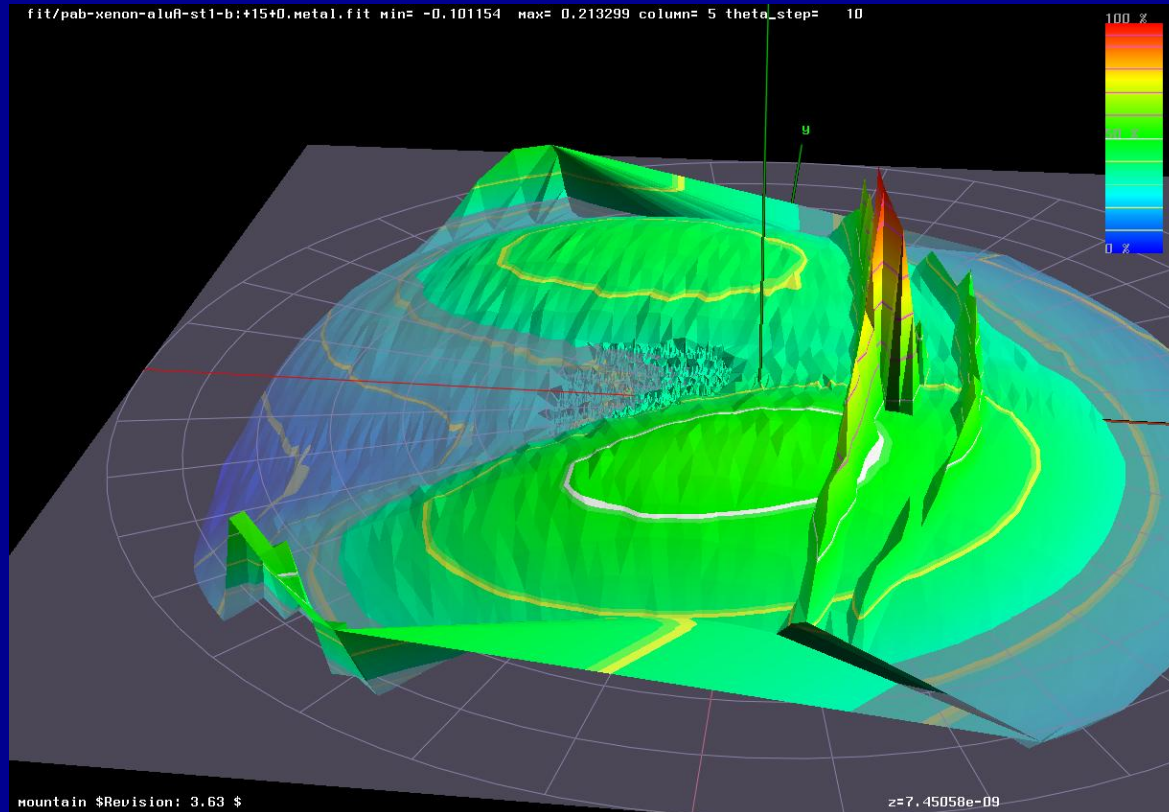
Example: Sandblasted Aluminium Surface

- visualisation of fitted metal model



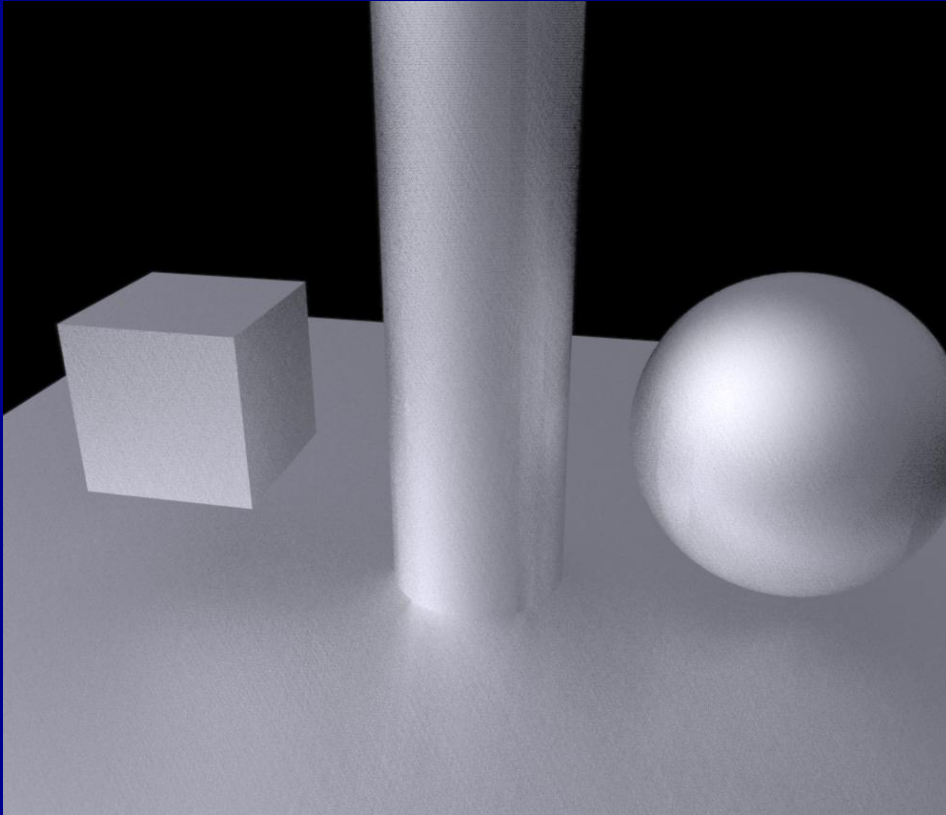
Example: Sandblasted Aluminium Surface

- visualisation of model/measurement difference

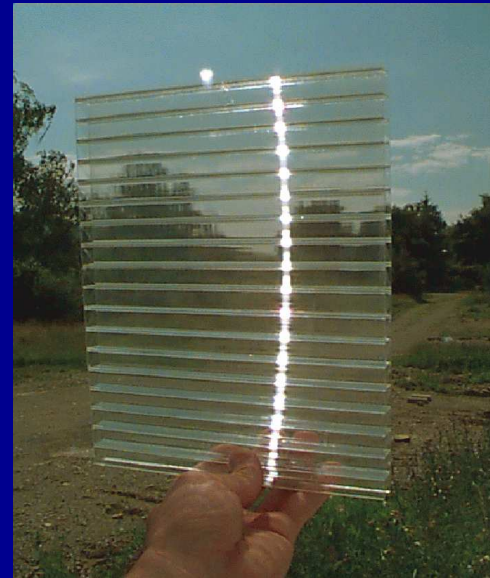
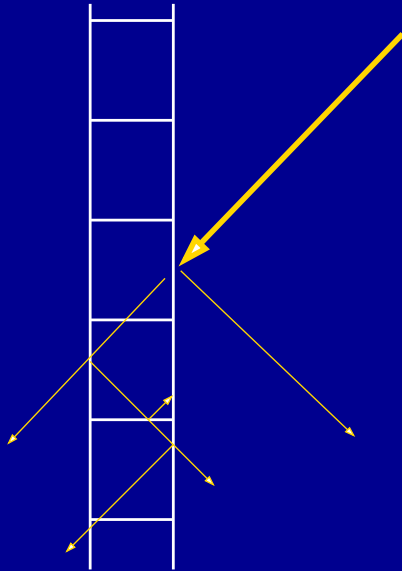


Example: Sandblasted Aluminium Surface

- metal applied to objects

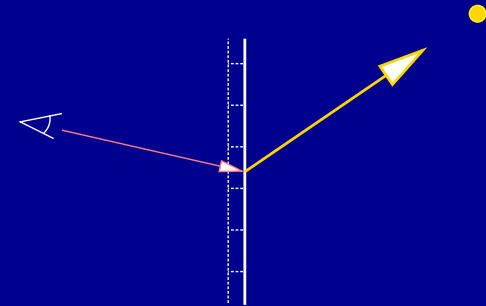


Example: Multiwalled Polycarbonate Roof



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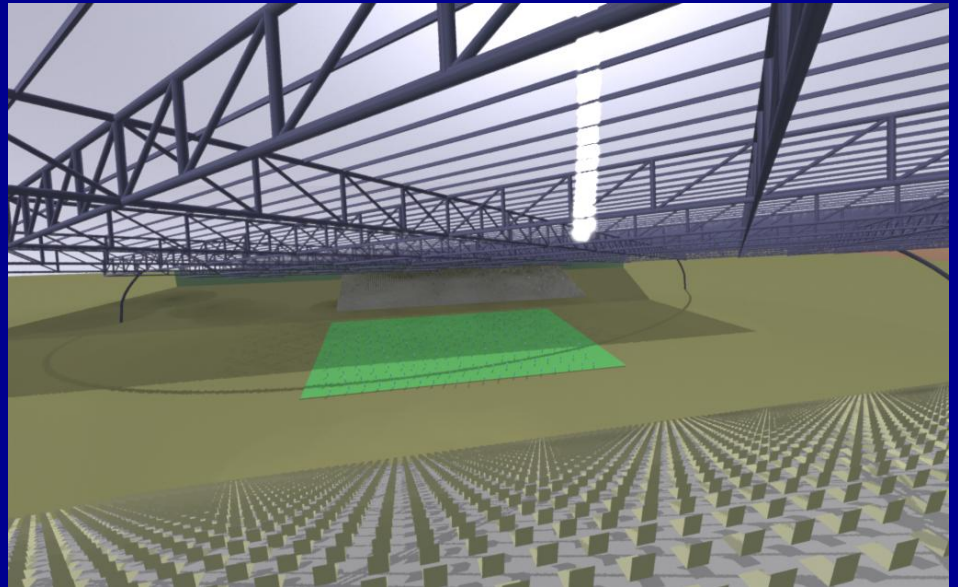
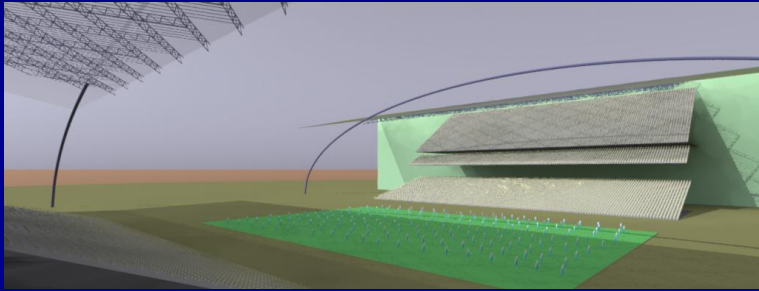
```
void transfunc roof
6 cellbrtf cellbrtf.cal -rz 45 -ry 0
0
9      1 1 1 0 1 1
      0.05      1000.0  1.0
```



```
alpha(ax,ay,az) = acos(sklp( ax,ay,az, Ex,Ey,Ez ));

cellbrtf( lx,ly,lz,Omega)= if(
                                abs(alpha(lx,ly,lz)-alpha( Dx,Dy,Dz )) - chwidth ,
                                min , max );
```

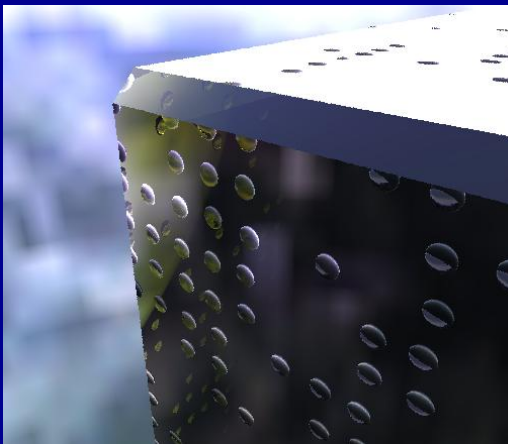
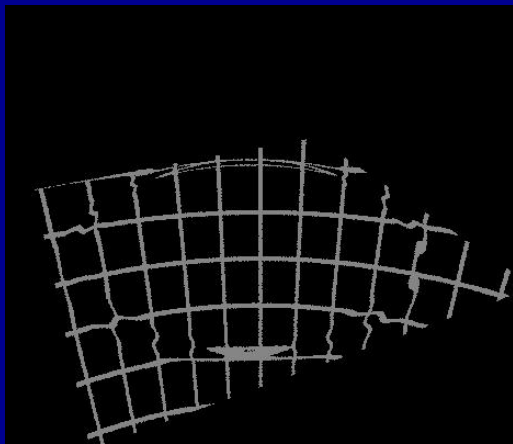
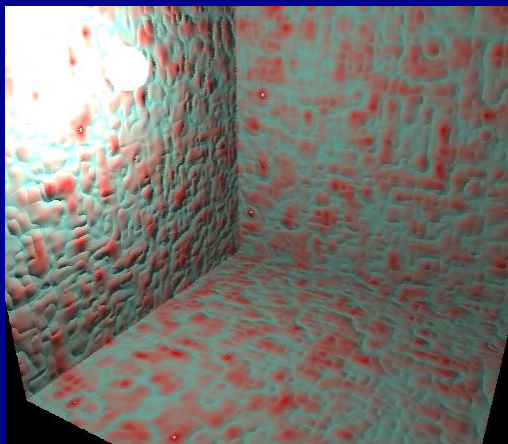
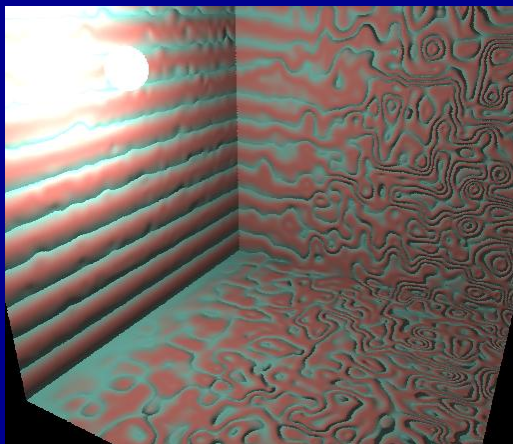
Example: Multiwalled Polycarbonate Roof



Stadium Australia of the Sydney Olympics 2000, Jan 1997 UTS Sydney

Example: "Exotics"

- pattern&texture mapping



use of material models:

- smaller, faster programs with simplified geometry
- visual appearance of real materials
- energy aspects of real materials



■ many thanks for your attention



■ <http://www.pab-opto.de/radiance>