



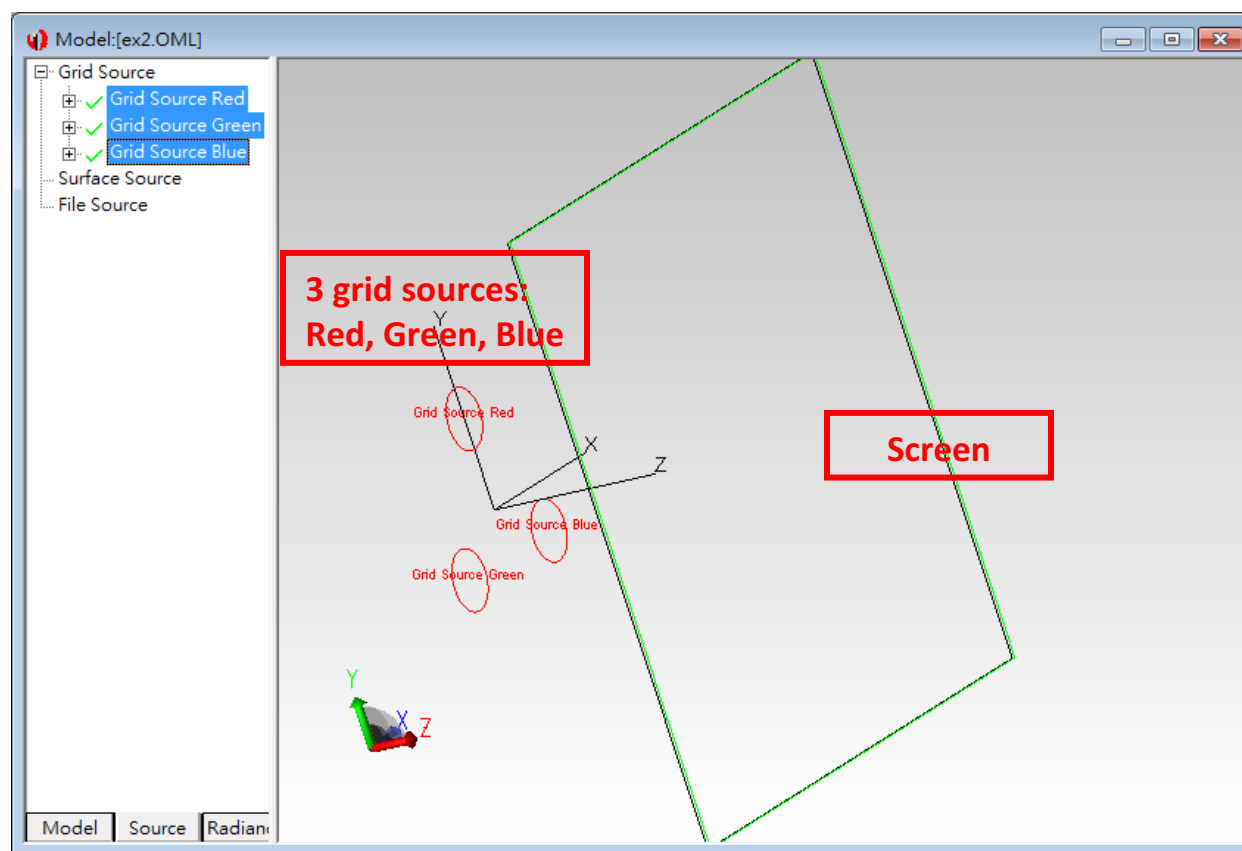
Trace**Pro**

COLOR MIXING OPTIMIZATION



Color mixing optimization

Model in TracePro (ex2.oml)



TracePro



Color mixing optimization

Grid sources

TracePro

Grid Source

Grid Setup | Beam Setup | Polarization | Wavelengths

Name: Grid Source Red

Grid Boundary: Annular

Outer radius: 1 Inner radius: 0

Grid Pattern: Random

Units: Radiometric Rays/wave: 100000

Flux per ray: 8.043265938 Watts

Grid Position and Orientation: Direction Vectors

Origin	Normal vector	Up vector
X: 0	X: 0	X: 0
Y: 3	Y: 0	Y: 1
Z: 0	Z: 1	Z: 0

Color: Red

Insert Modify Set Defaults

Red(0.6328um)

Grid Source

Grid Setup | Beam Setup | Polarization | Wavelengths

Name: Grid Source Green

Grid Boundary: Annular

Outer radius: 1 Inner radius: 0

Grid Pattern: Random

Units: Radiometric Rays/wave: 100000

Flux per ray: 8.9256352186 Watts

Grid Position and Orientation: Direction Vectors

Origin	Normal vector	Up vector
X: -2.5980762	X: 0	X: -0.8660254
Y: -1.5	Y: 0	Y: -0.5
Z: 0	Z: 1	Z: 0

Color: Green

Insert Modify Set Defaults

Green(0.5461um)

Grid Source

Grid Setup | Beam Setup | Polarization | Wavelengths

Name: Grid Source Blue

Grid Boundary: Annular

Outer radius: 1 Inner radius: 0

Grid Pattern: Random

Units: Radiometric Rays/wave: 100000

Flux per ray: 7.3176860805 Watts

Grid Position and Orientation: Direction Vectors

Origin	Normal vector	Up vector
X: 2.5980762	X: 0	X: 0.8660254
Y: -1.5	Y: 0	Y: -0.5
Z: 0	Z: 1	Z: 0

Color: Blue

Insert Modify Set Defaults

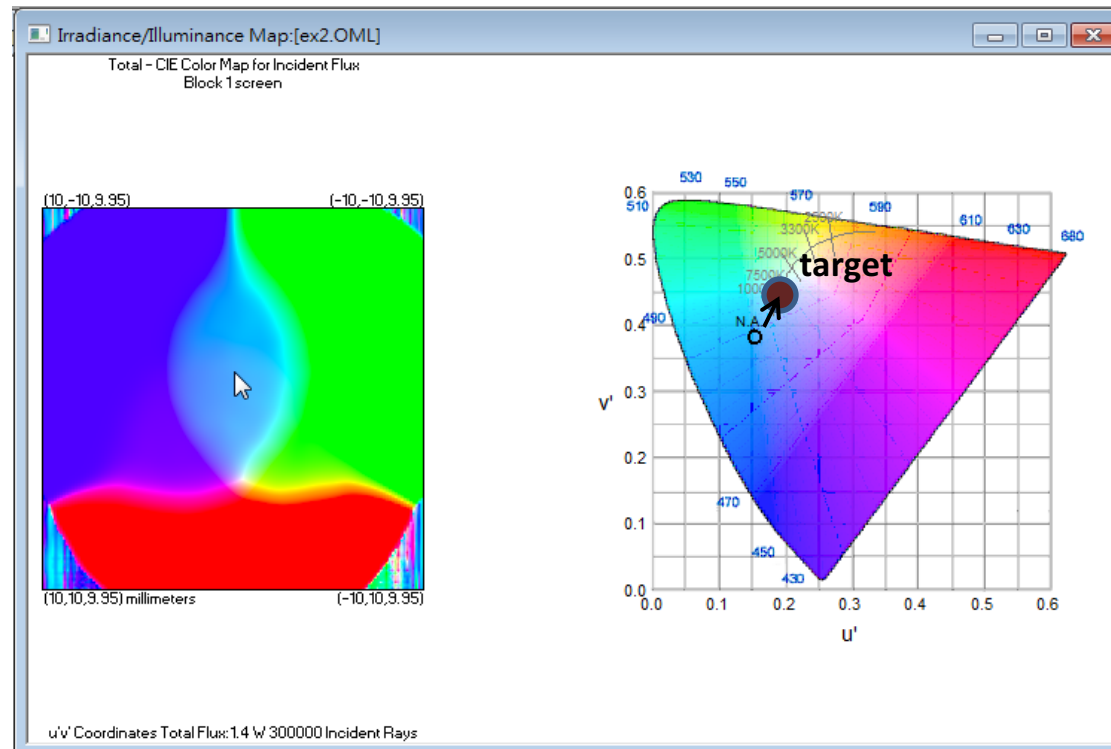
Blue(0.45um)



Color mixing optimization

Target

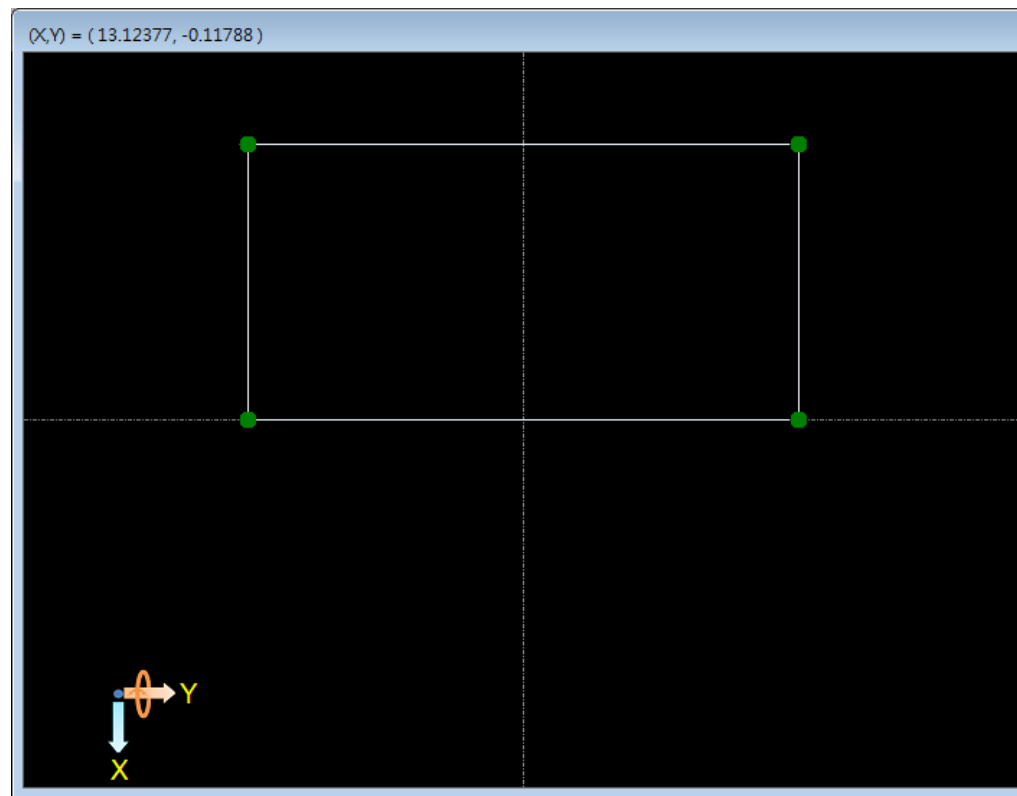
- Adjust the flux of each grid source to make the color in the central area is close to white $(u', v') = (0.2, 0.466)$





Color mixing optimization

Start a new design in the Interactive Optimizer. No need to make any change to the initial object, since in this example, the goal is not to optimize the optics but the flux of each grid source.



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Color mixing optimization

Launch the Optimization window.

In the Variables grid view, insert three user-defined variables and name them as “r”, “g” and “b”. Set the initial values and lower/upper limits are follows.

Save path: B

File prefix:

Variables

Object	ID	Type	Value	Lo limit/Pickup value	Hi limit
r		User-defined	0.1	0.1	1
g		User-defined	0.5	0.5	1
b		User-defined	0.8	0.5	0.5

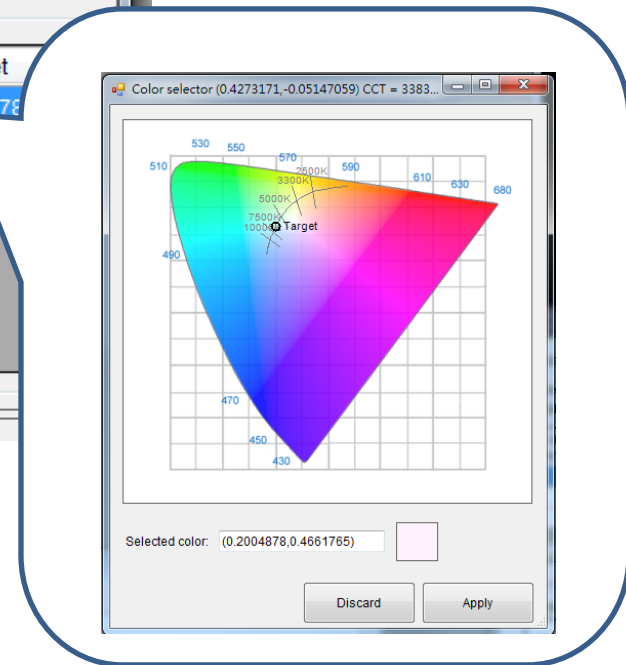
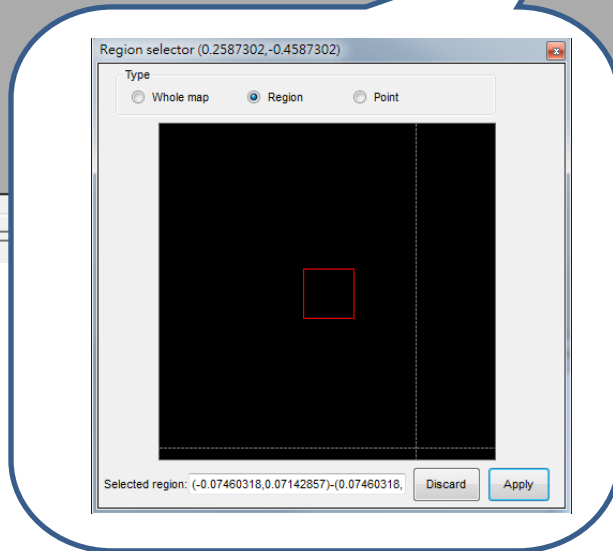
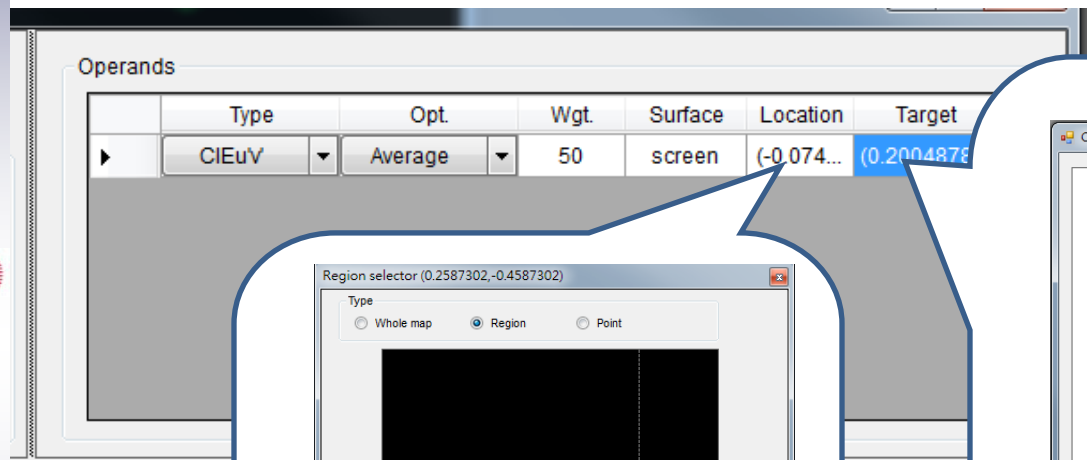
Objects



Color mixing optimization

Insert a new operand as the target. In this case, we want to get a white color in the central area, so drag a rectangle as the analysis location and choose white $(u', v') = (0.2, 0.46)$ as our target color.

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Color mixing optimization

In this example, there is no need to really create any optics in TracePro. Uncheck all object and then double-click on the after-scheme cell at the 1st row to open the scheme editor. Type in the codes as the picture below.

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Output?	Object ID	Name	Mat. Catalog	Mat. Property	Geo. type	Linked Obj / Length	After-scheme
☒		Pre-processor					(raytrace:set-grid-total...
☐	0	Object 0			RadialSym...		

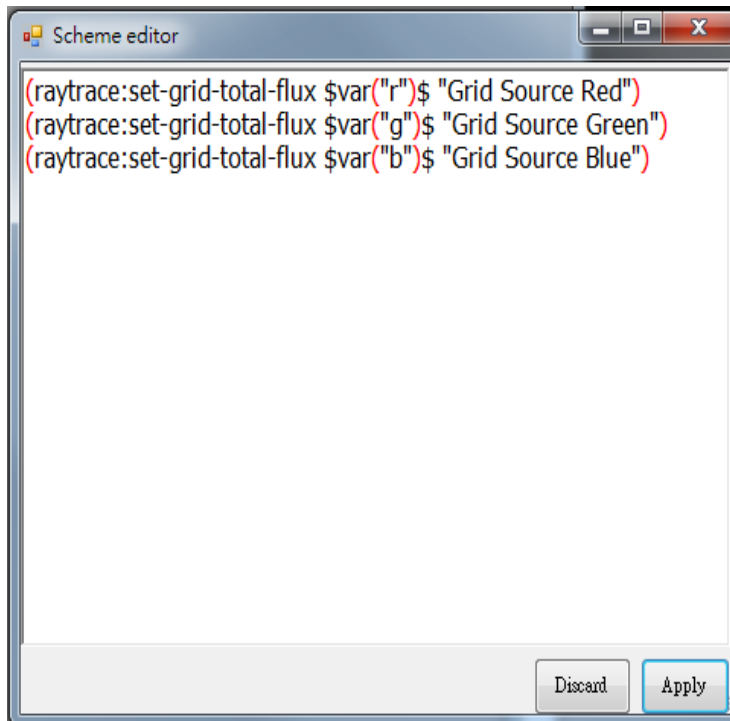
```
(raytrace:set-grid-total-flux $var("r")$ "Grid Source Red")
(raytrace:set-grid-total-flux $var("g")$ "Grid Source Green")
(raytrace:set-grid-total-flux $var("b")$ "Grid Source Blue")
```

Discard Apply



Color mixing optimization

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More details about the supported commands can be referred in the document entitled "Commands of Interactive Optimization"

Code explanations:

(raytrace:set-grid-total-flux) is a scheme command which is to set the flux value for the specified grid source.

Interactive optimizer now can embed its own commands into a pure scheme sentence.

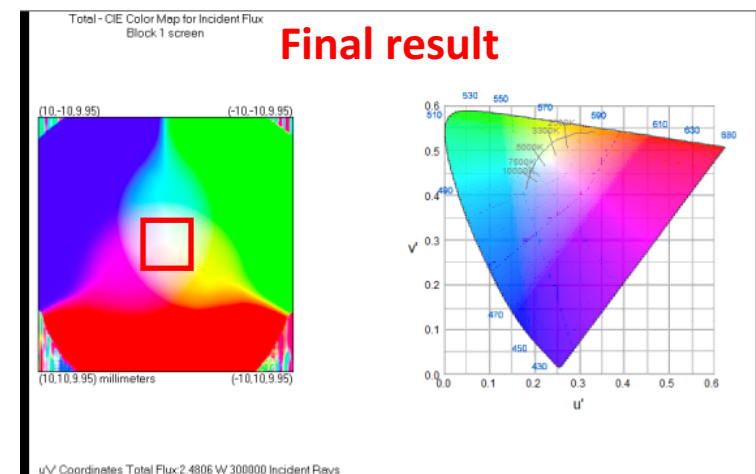
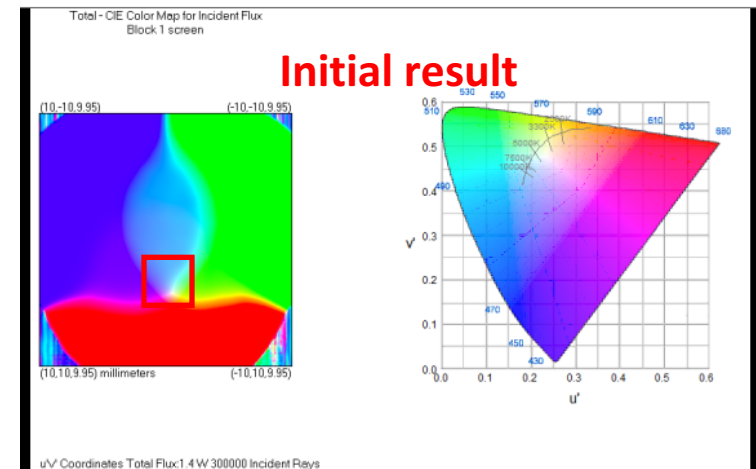
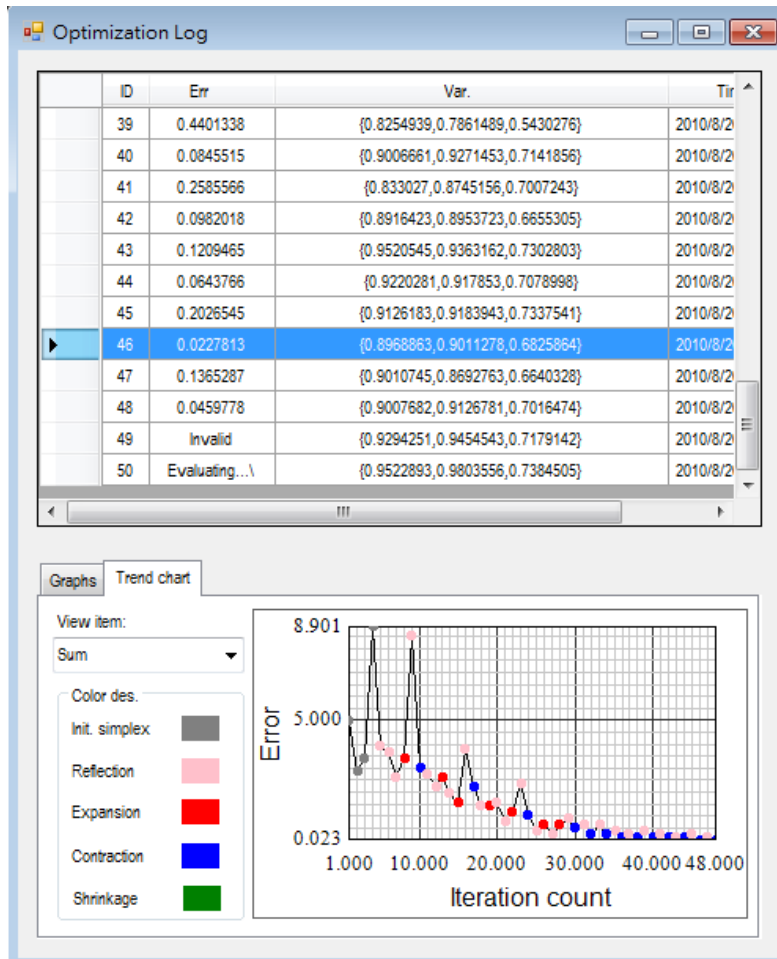
On this page, we had already inserted 3 user-defined variable named "r", "g" and "b". The built-in command var(var_name) can retrieve the corresponding user-defined value when optimizing.

But please note, a pair of dollar signs is necessary for the interpreter to recognize the embedded command.



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Color mixing optimization

shows a very important new possibility created by the Interactive Optimizer. Combining a user-defined variable and scheme language, the Interactive Optimizer can be an optimization platform. Users can take the advantage of using both the Scheme macro language and variables to optimize more complicated systems.

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Following this concept, we can add powerful optimization algorithms, such as Global Explorer, to search for global minima. Look for this new feature in an upcoming release of the interactive optimizer.