

Hilbert's 13th Problem

```
In[ ]:= SetDirectory["C:\\drorbn\\AcademicPensieve\\2014-11\\H13"]
```

```
Out[ ]:= C:\drorbn\AcademicPensieve\2014-11\H13
```

Pensieve Header: Hilbert's 13th problem - Step 2 (2019 High Resolution, failed).

```
In[ ]:= << "../..//2009-11/Hilbert13th-Program.m"
```

```
In[ ]:=  $\phi_1 := \text{Phi}[\text{Identity}, 2, 0.3, 2/3];$   
 $\phi_2 := \text{Phi}[\phi_1, 12, 0, 0.95];$ 
```

```
In[ ]:=  $\text{phi1} := \text{Phi}[\text{Identity}, 2, 0.3, 2/3];$   
 $\text{phi2} := \text{Phi}[\text{phi1}, 12, 0, 0.8];$   
 $\text{phi3} := \text{Phi}[\phi, \phi \rightarrow \text{phi1}, \text{Subdivisions} \rightarrow 12, \text{Slope} \rightarrow 0, \text{FillFactor} \rightarrow 0.8];$   
 $g1 = G[f, \text{phi1}];$   
 $g2 = G[f, \text{phi2}];$ 
```

```
In[ ]:= Step2Cascade = Rasterize[  
  Plot3D[ $\phi_2[x] + \lambda * \phi_2[y]$ , {x, 0, 1}, {y, 0, 1},  
  PlotPoints  $\rightarrow$  479, Mesh  $\rightarrow$  23, ViewPoint  $\rightarrow$  {-2, -2, 1}, NormalsFunction  $\rightarrow$  None,  
  Boxed  $\rightarrow$  False, Axes  $\rightarrow$  None, ColorFunction  $\rightarrow$  Automatic, ColorFunctionScaling  $\rightarrow$  True  
  ]  
];
```

```
In[ ]:= res = 600;
Timing[
  Step2CascadeWithG2 = Rasterize[
    Plot3D[phi2[x] + λ * phi2[y], {x, 0, 1}, {y, 0, 1},
      PlotPoints → 3 res / 4 - 1, Mesh → 11, ViewPoint → {-2, -2, 1}, NormalsFunction →
      None, ColorFunction → (Hue[g2[#3]] &), ImageSize → res, Axes → None, Boxed → False
    ], ImageSize → res, RasterSize → res
  ]
]
```

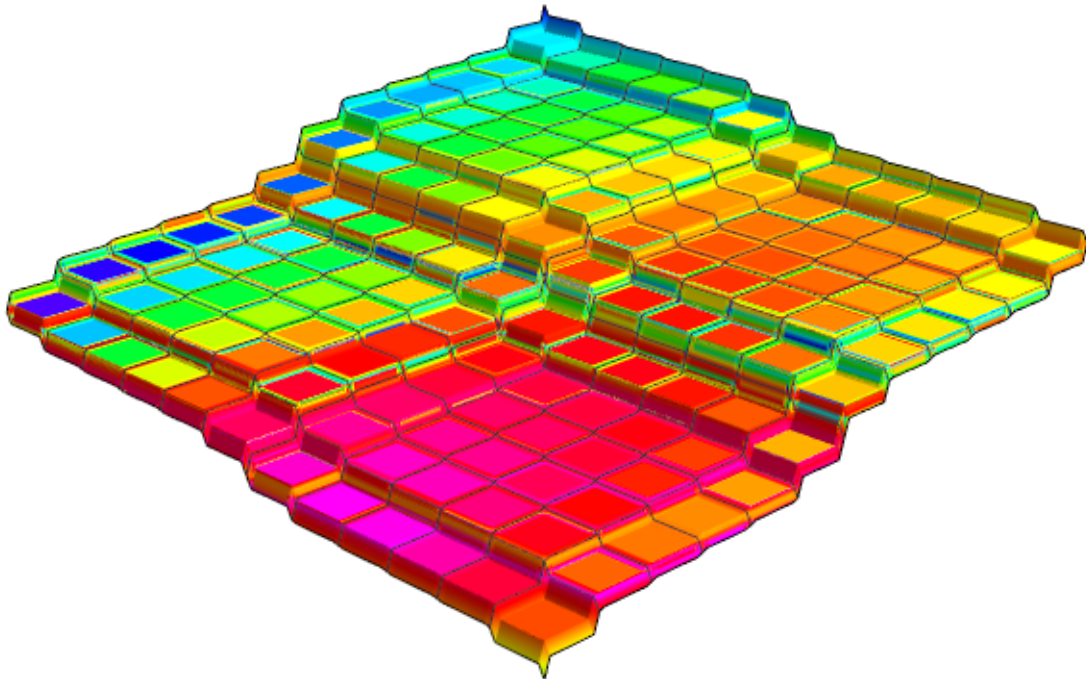
InterpolatingFunction: Input value {4.33402 × 10⁻⁸} lies outside the range of data in the interpolating function. Extrapolation will be used.

InterpolatingFunction: Input value {0.0267858} lies outside the range of data in the interpolating function. Extrapolation will be used.

InterpolatingFunction: Input value {0.0535715} lies outside the range of data in the interpolating function. Extrapolation will be used.

General: Further output of InterpolatingFunction::dmval will be suppressed during this calculation.

Out[]:= {99.2969,



```

In[ ]:= res = 6000;
Timing[
  Step2CascadeWithG2 = Rasterize[
    Plot3D[phi2[x] + λ * phi2[y], {x, 0, 1}, {y, 0, 1},
      PlotPoints → 3 res / 4 - 1,
      Mesh → 11, ViewPoint → {-2, -2, 1}, NormalsFunction → None,
      ColorFunction → (Hue[g2[#3]] &), ImageSize → res, Axes → None, Boxed → False
    ], ImageSize → res, RasterSize → res
  ];
]

```

InterpolatingFunction::dmval : Input value $\{6.93443 \times 10^{-7}\}$ lies outside the range of data in the interpolating function. Extrapolation will be used. >>

InterpolatingFunction::dmval : Input value $\{0.1\}$ lies outside the range of data in the interpolating function. Extrapolation will be used. >>

InterpolatingFunction::dmval : Input value $\{0.1\}$ lies outside the range of data in the interpolating function. Extrapolation will be used. >>

General::stop : Further output of InterpolatingFunction::dmval will be suppressed during this calculation. >>

{2.932819, Null}

```

Export[
  "Step2CascadeWithG2_6000.png",
  Step2CascadeWithG2, ImageSize → res, RasterSize → res
]
Step2CascadeWithG2.png

```