Monomial Hyperribbons

(Sethna)

In[∘]:=
```
xs[M_] := Table[m / (M - 1.), {m, 0, M - 1}]
J[M_, N_] := Table[Table[If[xi == 0 && n == 0, 1, xi ^ n], {n, 0, N - 1}], {xi, xs[M]}]
```

In[∘]:=
```
MatrixForm[J[6, 6]]
Det[J[6, 6]]
```

Out[∘]//MatrixForm=

$$\begin{pmatrix} 1 & 0. & 0. & 0. & 0. & 0. \\ 1. & 0.2 & 0.04 & 0.008 & 0.0016 & 0.00032 \\ 1. & 0.4 & 0.16 & 0.064 & 0.0256 & 0.01024 \\ 1. & 0.6 & 0.36 & 0.216 & 0.1296 & 0.07776 \\ 1. & 0.8 & 0.64 & 0.512 & 0.4096 & 0.32768 \\ 1. & 1. & 1. & 1. & 1. & 1. \end{pmatrix}$$

Out[∘]=

1.13246×10^{-6}

In[∘]:=
```
Det[J[6, 6]]
```

Out[∘]=

1.13246×10^{-6}

In[∘]:=
```
{U, Σ, V} = SingularValueDecomposition[J[11, 6]];
Σ // MatrixForm
ratios = Table[Σ[[i, i]] / Σ[[i + 1, i + 1]], {i, 1, Length[Σ[[1]]] - 1}]
```

Out[∘]//MatrixForm=

$$\begin{pmatrix} 4.36028 & 0. & 0. & 0. & 0. & 0. \\ 0. & 1.80722 & 0. & 0. & 0. & 0. \\ 0. & 0. & 0.491937 & 0. & 0. & 0. \\ 0. & 0. & 0. & 0.100647 & 0. & 0. \\ 0. & 0. & 0. & 0. & 0.0149782 & 0. \\ 0. & 0. & 0. & 0. & 0. & 0.00138943 \\ 0. & 0. & 0. & 0. & 0. & 0. \\ 0. & 0. & 0. & 0. & 0. & 0. \\ 0. & 0. & 0. & 0. & 0. & 0. \\ 0. & 0. & 0. & 0. & 0. & 0. \\ 0. & 0. & 0. & 0. & 0. & 0. \end{pmatrix}$$

Out[∘]=

{2.41271, 3.67368, 4.88773, 6.71959, 10.7801}