$-\frac{\mathbf{d}^2 y_n}{\mathbf{d}\boldsymbol{x}^2} + \boldsymbol{x} y_n = \lambda_n y_n$

on $0 \leqslant x \leqslant \infty$, with $y(0) = y(\infty) = 0$.

To this equation the solution is:

$y_n = C_1 \operatorname{Ai}(x - \lambda_n)$

Where C_1 is an arbitrary constant, and $-\lambda_n$ are the zeros of the Airy function, $\operatorname{Ai}(x)$, on the negative x axis, i.e. $\operatorname{Ai}(-\lambda_n) = 0 \quad \forall\, n.$ *

n	λ_n
1	2.33811
2	4.08795
3	5.52056
4	6.78671
5	7.94413
6	10.0402

To numerically integrate this solution let us use a Chebyshev spectral method. If t_m comprises points on the Chebyshev extrema grid, that is:

$t_m = -\cos\left(\frac{\pi m}{N}\right), \qquad m \in [0, 1, 2, \ldots, N]$

then:

$x_m = L\left(\frac{1+t_m}{1-t_m}\right)$

.

This is a rational transformation from the Chebyshev extrema grid to the semi-infinite domain.