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Erratum: Numerical Simulations on Nonlinear Quantum Graphs with the GraFiDi Library

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Keywords. Quantum Graphs; Python Library; Nonlinear Schrodinger equation; Finite Differences; Ground states.

In the published version of our article [1], an error occurred in the presentation of Listing 8. Due to an oversight during the production process, Listing 8 was inadvertently replaced by a copy of Listing 7. The correct version of Listing 8 is provided below.

```
fun = {}
fun[('D', 'B', 'O')]=lambda x: np.exp(-10e-2*(x-20)**2)
fun[('C', 'A', 'O')]=lambda x: np.exp(-10e-2*(x-20)**2)
fun[('A', 'B', 'O')]=lambda x: 1-(x-10)*x/50
fun[('B', 'A', 'O')]=lambda x: 1+(x-5)*x/20
fun[('B', 'A', '1')]=lambda x: 1+(x-10)*x/30

u   = WF(fun,g)
rho = 1
u   = rho*u/WF.norm(u,2)

def E(u):
    return -0.5*WF.Lap(u).dot(u) - 0.25*WF.norm(u,4)**4
En0 = E(u)

delta_t = 10e-1
Epsilon = 10e-8
M_1 = g.Id - delta_t*g.Lap
```

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```
for n in range(1000):
    u_old = u
    M = M_1 - delta_t*GR.Diag(g,abs(u)**2)
    u = WF.Solve(M,u)
    u = rho*WF.abs(u)/WF.norm(u,2)
    En = E(u)
    print(f"Energy evolution: {En-En0 : 12.8e}",end='\r')
    En0 = En
    Stop_crit = WF.norm(u-u_old,2)/WF.norm(u_old,2)<Epsilon
    if Stop_crit:
        break

_=WF.draw(u)
print()
```

Listing 8. Computation of a ground state using the CNGF method.

References

[1] Christophe Besse, Romain Duboscq, and Stefan Le Coz. Numerical simulations on nonlinear quantum graphs with the GraFiDi library. *SMAI J. Comput. Math.*, 8:1–47, 2022.