# Cyclist relaxation methods

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## 1 Cyclist relaxation methods for the Hénon and Ikeda maps

- `CyclHenon.m` – This procedure computes the prime cycles of the Hénon map (for the parameters $a = 1.4$ and $b = 0.3$) by the cyclist relaxation method.
- `CyclIkeda.m` – This procedure computes the periodic orbits of the Ikeda map by the cyclist relaxation method.
- `DiscrCyclIkeda.m` – This procedure computes the periodic orbits of the Ikeda map by the *discrete* cyclist relaxation method.

**Example:**

```
>> CyclHenon(6)

period =

-0.7277616264
+0.5795436607
+0.3114523155
+1.0380595355
-0.4151589443
+1.0701181320

period =

+0.4853358626
+0.8028017261
+0.2433139027
+1.1579582005
-0.8042199010
+0.4419099514
```

## 2 Illustration of the cyclist relaxation method

- `VFIkedaFig1.m` – Plot of typical trajectories of the vector field $\dot{x} = f(x) - x$ for the stabilization of a hyperbolic fixed point of the Ikeda map located at $(x, y) \approx (0.53275, 0.24689)$.

- `VFIkedaFig2.m` – Plot of typical trajectories of the vector field $\dot{x} = C(f^3(x) - x)$ for a hyperbolic fixed point $(x, y) \approx (-0.13529, -0.37559)$ of $f^3$, where $f$ is the Ikeda map. The circle indicates the position of the fixed point. For the vector field corresponding to $(a)$ $\mathbf{C} = \mathbf{1}$, $x_*$ is a hyperbolic stationary point of the flow, while for $(b)$ $\mathbf{C} = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$, $x_*$ is an attracting stationary point.

**Reference:**
Chapter *Fixed points, and how to get them*
Section *Periodic orbits as extremal orbits*

P. Cvitanović, R. Artuso, R. Mainieri, G. Tanner and G. Vattay, *Classical and Quantum Chaos*, `www.nbi.dk/ChaosBook/`, Niels Bohr Institute (Copenhagen 2001)