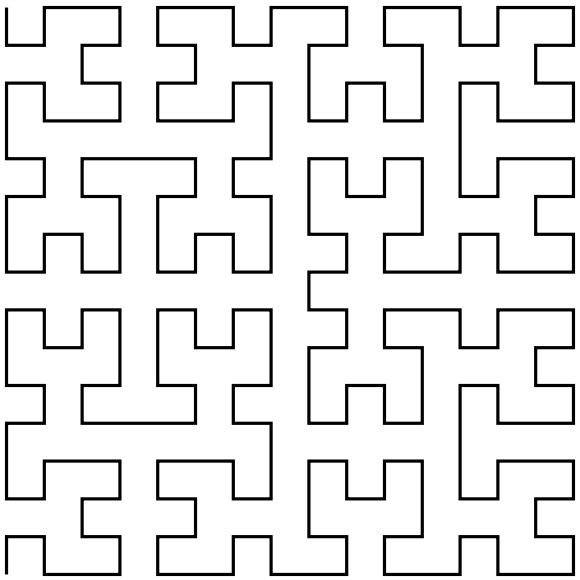
Systèmes de réécriture de Lindenmayer, quelques exemples en Tikz

On reproduit des exemples du livre *The algorithmic beauty of plants* de Aristid Lindenmayer et PrzemysłPrusinkiewicz : une lettre change, et tout est chamboulé !

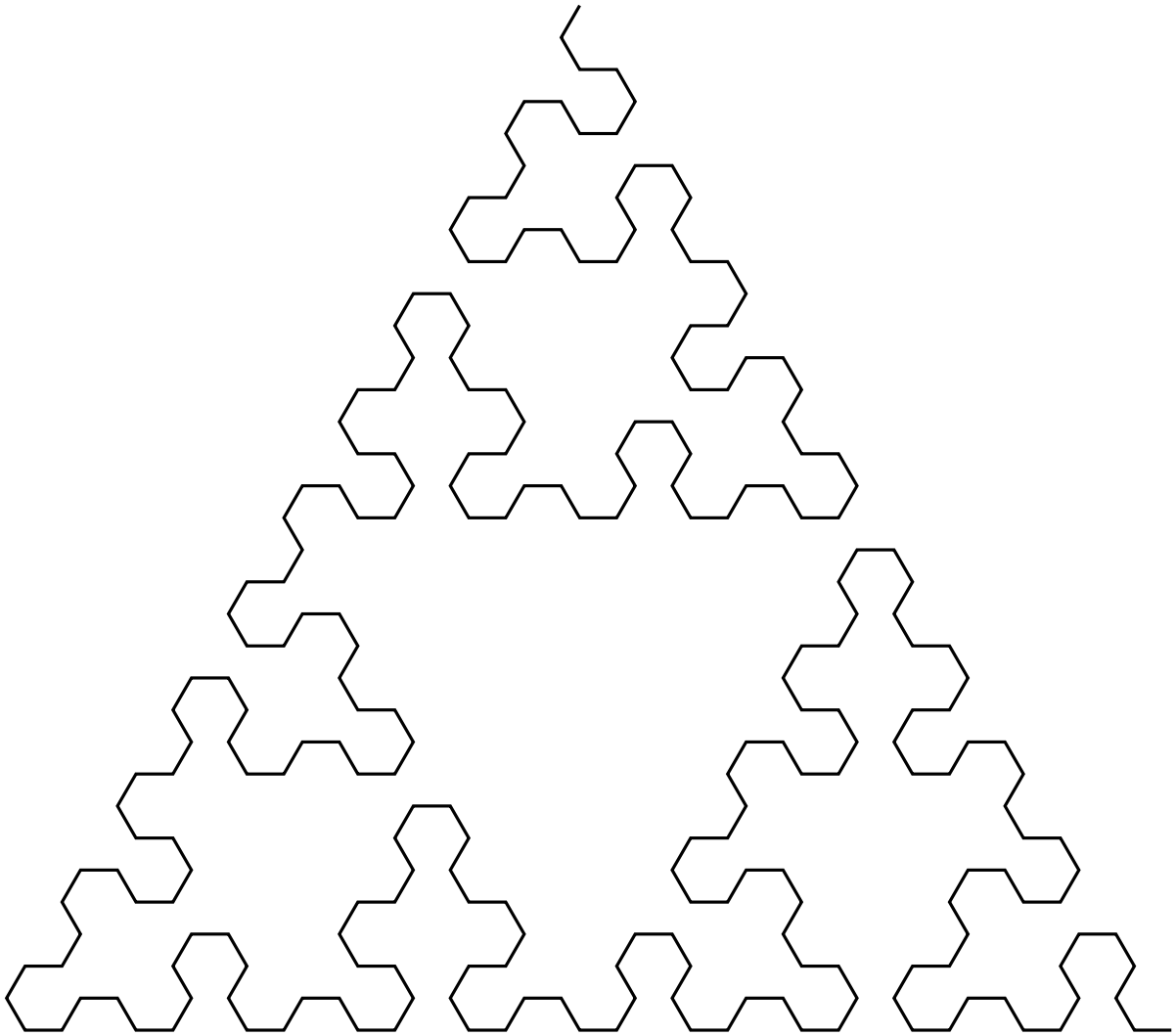
1) Courbe de Hilbert

```
\begin{tikzpicture}[l-system={step=1.75pt, order=4,
                                    angle=90}]
    \pgfdeclarelindenmayersystem{courbe de Hilbert}{
      \symbol{X}{\pgflsystemdrawforward}
      \symbol{+}{\pgflsystemturnright}
      \symbol{-}{\pgflsystemturnleft}
      \rule{A -> +BX-AXA-XB+}
      \rule{B -> -AX+BXB+XA-}
    }
    \draw [black,very thick] l-system
          [l-system={courbe de Hilbert, step=0.5cm,
                             axiom=+++A}];
\end{tikzpicture}
```



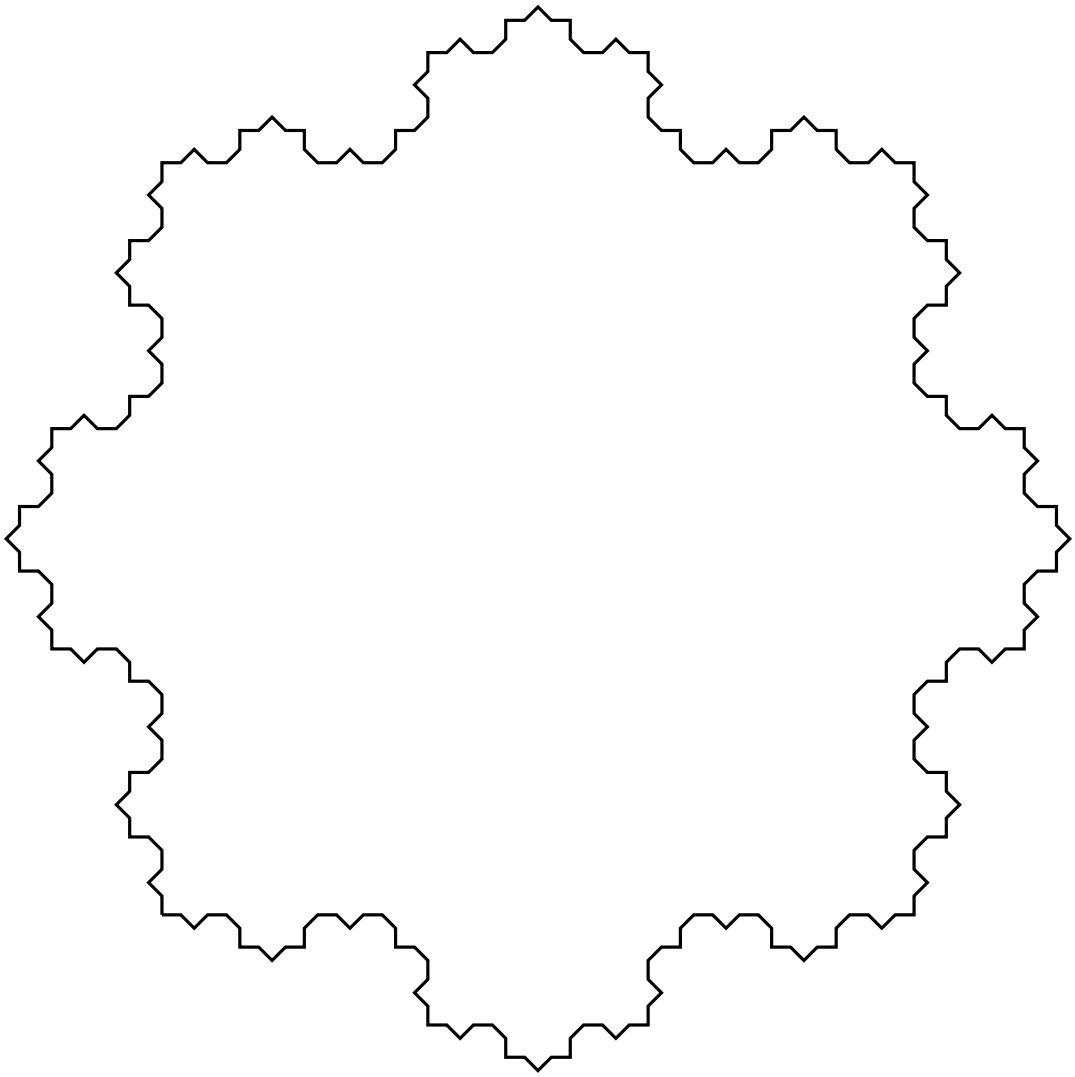
2) Triangle de Sierpinski

```
\begin{tikzpicture}[l-system={step=1.75pt, order=5, angle=60}]
    \pgfdeclarelindenmayersystem{triangle de Sierpinski}{
      \symbol{X}{\pgflsystemdrawforward}
      \symbol{Y}{\pgflsystemdrawforward}
      \rule{X -> Y-X-Y}
      \rule{Y -> X+Y+X}
    }
    \draw [black,very thick] l-system
          [l-system={triangle de Sierpinski, step=0.5cm,axiom=+++X}];
\end{tikzpicture}
```



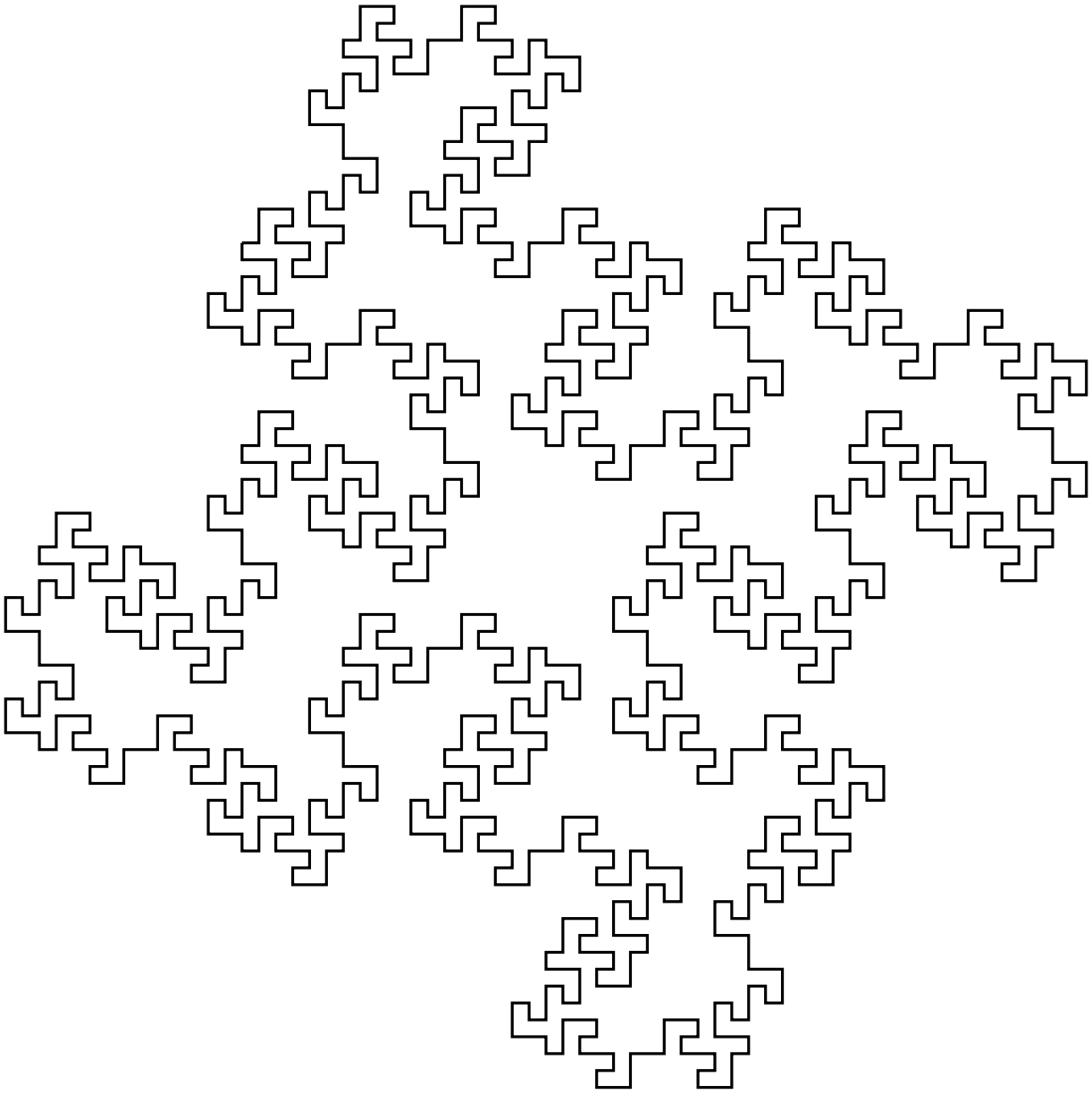
3) Courbe de von Koch

```
\begin{tikzpicture}[l-system={step=1.75pt, order=3, angle=45}]
    \pgfdeclarelindenmayersystem{courbe de von Koch}{
      \rule{F -> F-F++F-F}
    }
    \draw [black,very thick] l-system
            [l-system={courbe de von Koch, step=0.25cm,axiom = F++F++F++F}]
    \end{tikzpicture}
```



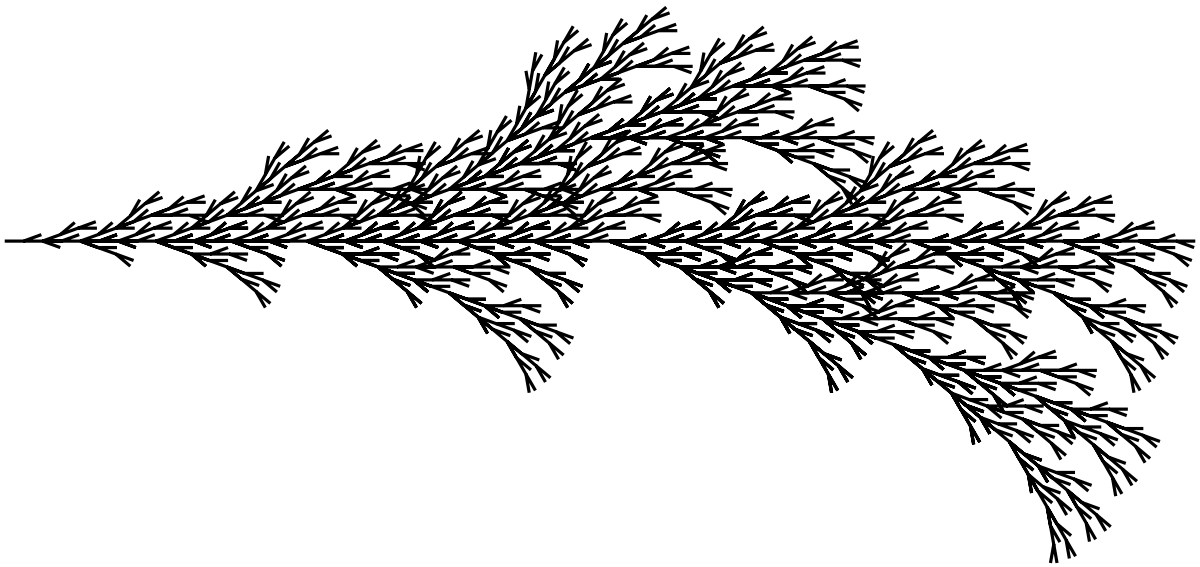
4) Fractale 1

```
\begin{tikzpicture}[l-system={step=1.75pt, order=2, angle=90}]
    \pgfdeclarelindenmayersystem{essai1}{
      \rule{F -> F+FF-FF-F-F+F+FF-F-F+F+FF+FF-F}
    }
    \draw [black,very thick] l-system
            [l-system={essai1, step=0.25cm,axiom = F-F-F-F}]
    \end{tikzpicture}
```



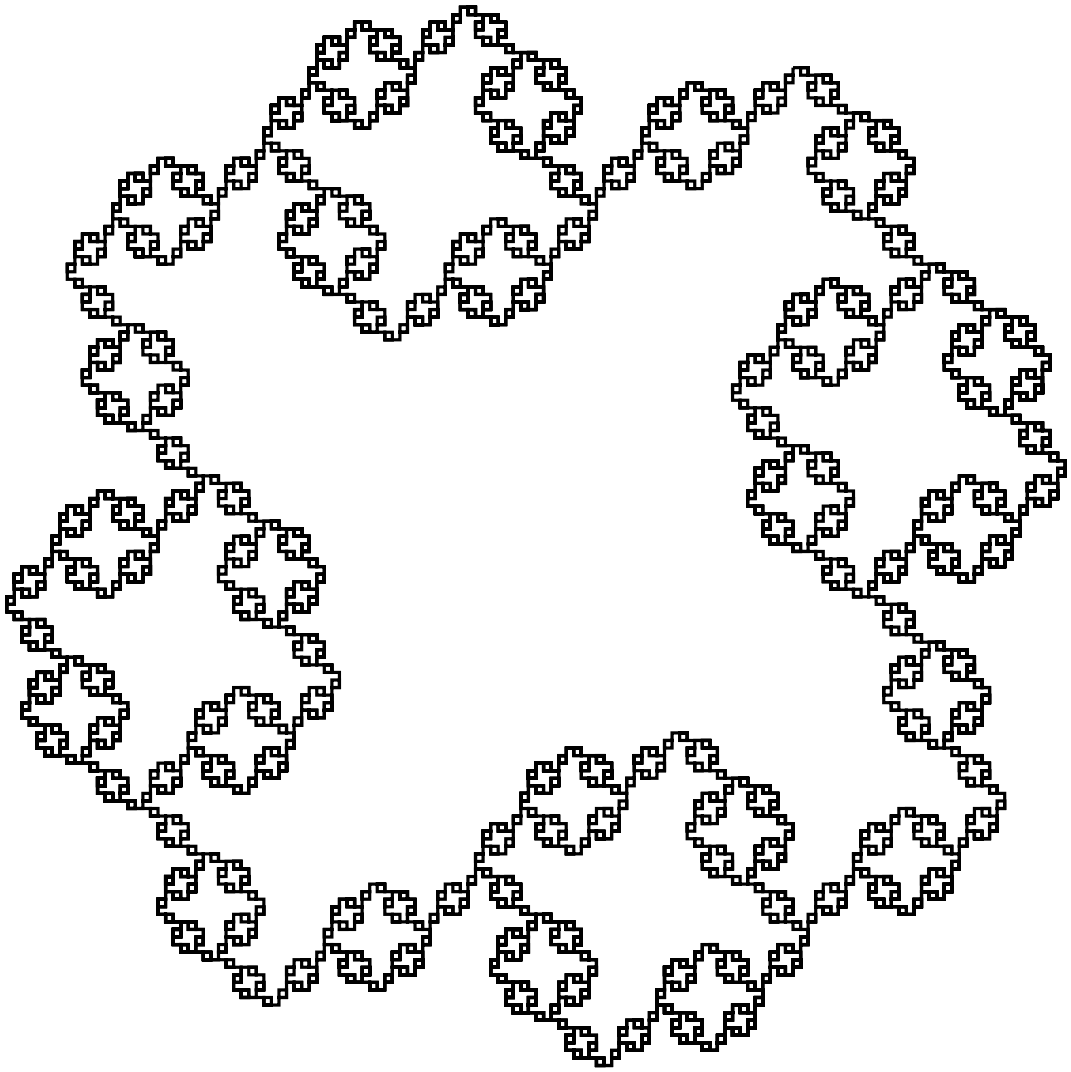
5) Fractale 2

```
\begin{tikzpicture}[l-system={step=1.75pt, order=5, angle=20}]
    \pgfdeclarelindenmayersystem{essai2}{
      \rule{F -> F[+F]F[-F][F]}
    }
    \draw [black,very thick] l-system
            [l-system={essai2, step=0.25cm,axiom = F}]
    \end{tikzpicture}
```



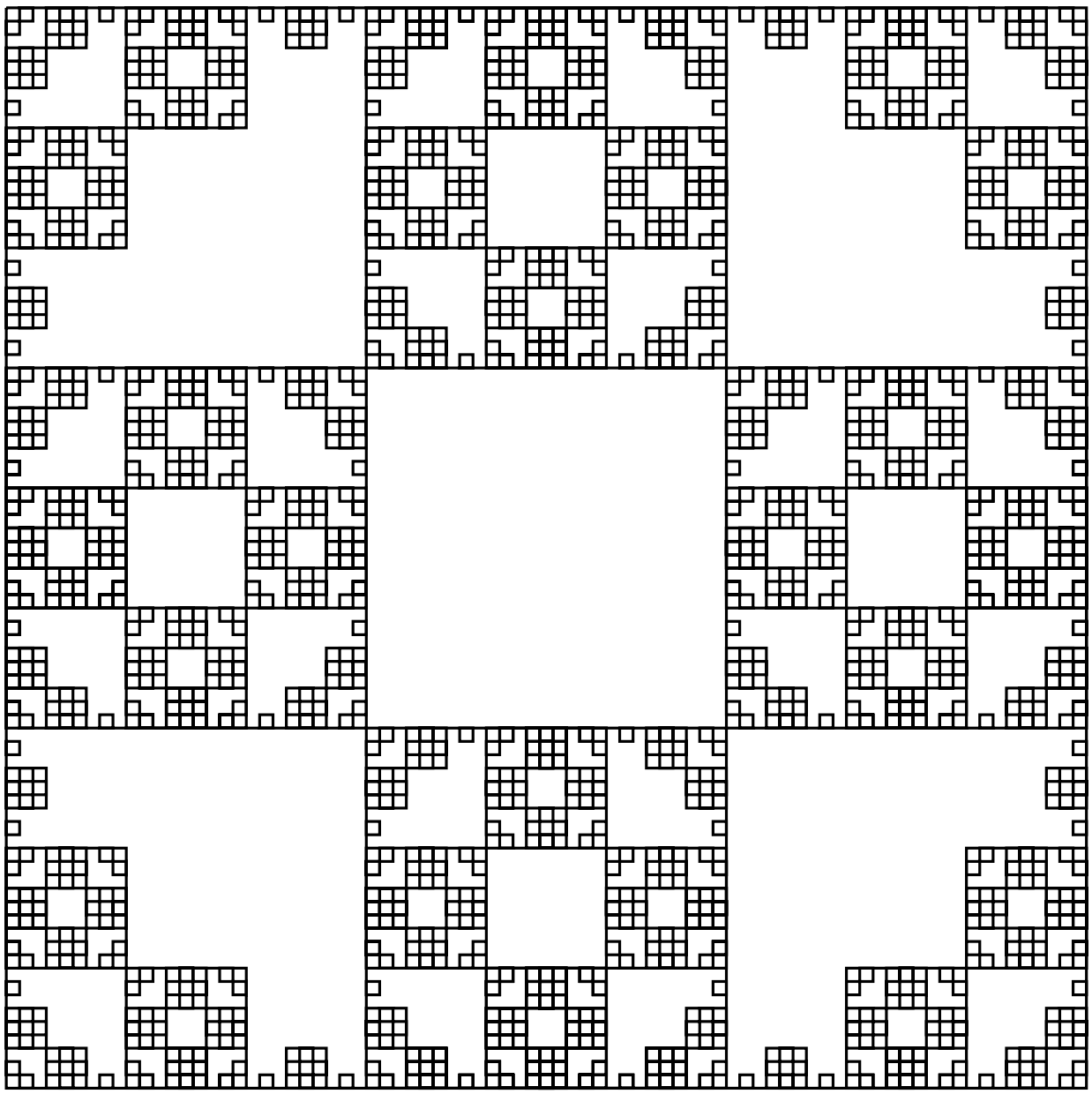
6) Fractale 3

```
\begin{tikzpicture}[l-system={step=1.75pt, order=4, angle=90}]
    \pgfdeclarelindenmayersystem{autre1}{
      \rule{F -> FF-F-F-F-F-F-F+F}
    }
    \draw [black,very thick] l-system
            [l-system={autre1, step=0.1cm,axiom = F-F-F-F}]
    \end{tikzpicture}
```



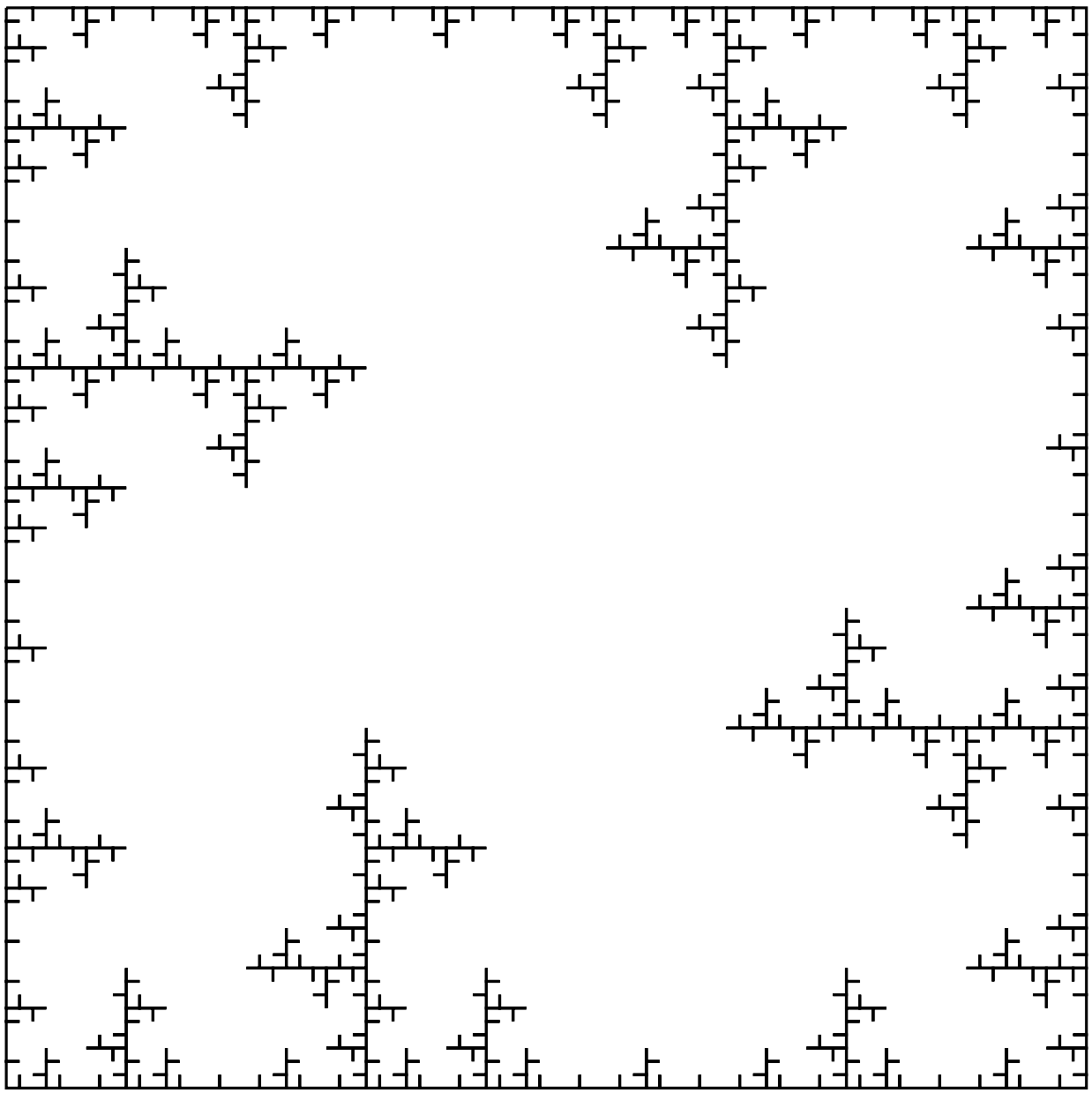
7) Fractale 4

```
\begin{tikzpicture}[l-system={step=1.75pt, order=4, angle=90}]
    \pgfdeclarelindenmayersystem{autre2}{
      \rule{F -> FF-F-F-F-FF}
    }
    \draw [black,very thick] l-system
            [l-system={autre2, step=0.2cm,axiom = F-F-F-F}]
    \end{tikzpicture}
```



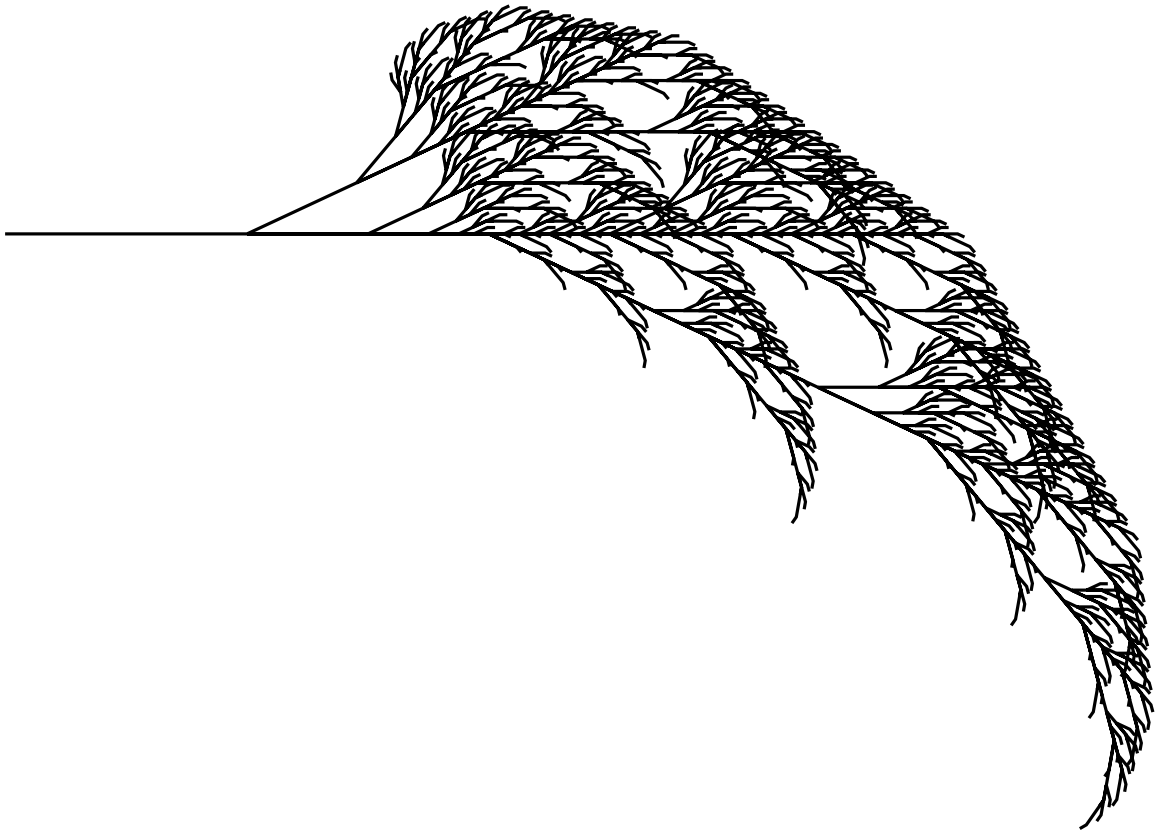
8) Fractale 5

```
\begin{tikzpicture}[l-system={step=1.75pt, order=4, angle=90}]
    \pgfdeclarelindenmayersystem{autre3}{
      \rule{F -> FF-F--F-F}
    }
    \draw [black,very thick] l-system
            [l-system={autre3, step=0.2cm,axiom = F-F-F-F}]
    \end{tikzpicture}
```



9) Dactyle

```
\begin{tikzpicture}[l-system={step=1.75pt, order=6, angle=25}]
  \pgfdeclarelindenmayersystem{toto}{
    \rule{X -> F+[[X]-X]-F[-FX]GX}
    \rule{F -> FF}
  }
  \draw [black,very thick] l-system [l-system={toto, step=0.1cm,axiom=GGGX}]
\end{tikzpicture}
```



Mais même si on a pu programmer des morceaux de pavages de Penrose et d'Ammann-Beenker en python, on ne parvient pas à les programmer par système de réécriture de Lindenmayer.