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$$dX/dt = \delta \cdot (Y - X)$$

$$dY/dt = r \cdot X - Y - X \cdot Z$$

$$dZ/dt = X \cdot Y - b \cdot Z$$

As you know in a **coupled system** the time evolution of one variable depends on other variables of the system. This implies that one variable contains information about the other variables (of course depending upon the strength of coupling and maybe the type of interaction)

Takens' theorem suggests that we should be able to reconstruct the higly chaotic "butterfly" attractor by just using X(t) [or Y(t) or Z(t)] …

Takens, F. (1981). Detecting strange attractors in turbulence. In D. A. Rand and L.-S. Young (Eds.) Dynamical Systems and Turbulence. *Lecture Notes in Mathematics vol. 898*, 366–381, Springer-Verlag.

# How to study interaction-dominant systems


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# Lorenz system – Time series of X, Y and Z