Part I
new chapter

1 Stochastic Resonance Equation

In our generic model we investigate the time evolution of a stochastic variable x. In our work we want to simulate a particle, that is performing a random walk in a fluid, namely the well known brownian motion. Here we investigate only the drift in x *direction*. Additionally the particle is moving in a potential $V(x)$ and we can switch on a driving force. It has two **minima**, where the particle can be located. These two states are separated trough a potential wall ΔV. The time evolution is described as follows:

$$x_t = -V_x(x) + A\cos(\omega t + \phi) + \sigma x(t) \tag{1}$$

The subscript variable means a derivative $x_t = \mathrm{d}x/\mathrm{d}t$. As usual: t time variable, A amplitude and ω frequency of the oscillator and $x(t)$ as noise, it is the temporal derivative of a Wiener Process.

$$\xi(t) = \frac{\mathrm{d}W}{\mathrm{d}t} \tag{2}$$

The potential function $V(x)$ of the stochastic variable x:

$$V(x) = -\frac{1}{2}x^2 + \frac{1}{4}x^4$$

We use an oscillator to get a triggered resonance. In our model we work with an additional Gaussian white noise and with the auto-correlation we get

$$\langle \xi(t)\xi(0) \rangle = 2D\delta(t) \tag{3}$$

with σ the noise factor, hence the variance of noise is $\sqrt{2D} = \sigma$. In our investigation we set the initial phase to

$$\varphi = 0\ .$$

We add all relations together and get for our simulation the main equation:

$$x_t = x^3 - x + A\cos(\omega t) + \sqrt{2D}x(t) \tag{4}$$

The two minima of the potential function are $x_\pm = \pm 1$ and hence we have $\Delta V = 1/4$.

1.1 something else

$$L_i V \tag{5}$$