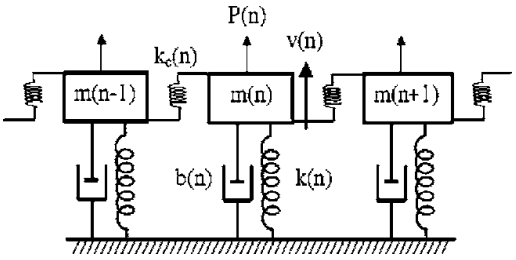
- The first task is to make a simple mass-spring cochlea model:



This figure taken from (Hubbard, 2006). Should possibly be redrawn anyway to include x_n.

$$\ddot{x_i} = -\frac{1}{m_i}\left(k_i x_i + c_i(x_i - x_{i-1}) + b_i \dot{x_i}\right)$$

With $v_i = \dot{x_i}$, this translates into two equations for a dynamical system:

$$\dot{v_i} = -\frac{1}{m_i}\left(k_i x_i + c_i(x_i - x_{i-1}) + b_i v_i\right)$$
$$\dot{x_i} = v_i$$

Of course, the actual dynamical system would have $2n$ equations, depending on the number of oscillators included.