

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

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

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

$$\begin{aligned}\dot{v}_i &= -\frac{1}{m_i} (k_i x_i + c_i(x_i - x_{i-1}) + b_i v_i) \\ \dot{x}_i &= v_i\end{aligned}$$

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