

# Basic Concepts

The cells states are stored in a 32-bit RGBA texture. The first value (electrical potential) is stored in the green channel, the second value (ion concentration) in the blue one.

The state transition function is implemented by a Pixel Shader that reads from the current state memory using texture lookups and writes to a target surface of the same format. After this step, both textures are swapped.

To integrate this two-dimensional functionality into the Direct3D environment, there is need for a (pseudo) 3D structure. The square surface is therefore modeled by a quad consisting of two equilateral triangles. These are projected onto two triangles of the same shape during the state transition process.

For this implementation, the cell lattice forms a torus. This can be achieved easily by setting the texture lookup mode to „wrap-around“. To achieve constant border conditions, cells located at the border can be excluded from the update by having a small margin in the projection, i. e. the projection does not cover the whole square.