So, about the actually used particle model...
Each particle has its mass m, the velocity $\vec{v}$ and position $\vec{p}$.
The starting position p_0 is the placement of the hair root on the surface and the velocity v_0 has the same direction as the normal and length according to desired strength and length.
Then the simulation runs by the equations:

$$\vec{p}=\int \vec{v}\ dt \qquad \vec{v}=\int \vec{a}\ dt \qquad \vec{a}=\frac{\vec{F}}{m}$$

where the last part with F is computed using gravity divided by a constant.
But I don't think this should be in the paper, its really the simplest way how to do it.

About the second model, the particle equations are exactly the same, but its necessary to add the springs and friction. The friction equations should be a little bit more complex but its hard to tell now, I haven't try it for this case. So, adding the friction to above:

$$\vec{F}_{fric}=-\vec{v}\cdot k_{f1}$$

and the spring equations:

$$\vec{f}_1=-\vec{f}_2=\frac{\vec{p}_2-\vec{p}_1}{|\vec{p}_2-\vec{p}_1|}\cdot\left(|\vec{p}_2-\vec{p}_1|-l\right)\cdot k_s$$

$$\vec{f}_{f1}=-\vec{f}_{f2}=\left(v_2-v_1\right)\cdot k_{f2}$$

where the k_s is spring constant and f are the forces applied to the connected particles.
But again, its one of the simplest ways how to do it...
The actual integration is based on Euler's method, so:

$$a_{t+1}=a_t+dt\ a_t'$$

in other words:

$$p_{t+1}=p_t+v_t\ dt \qquad \text{etc.}$$