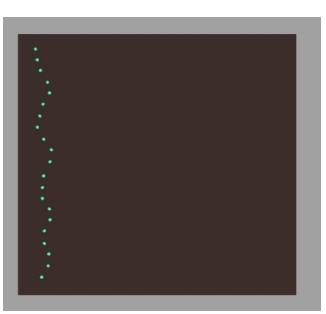
## Per-Particle Expressions, Per-Particle Field Attributes, Noise and Rand

In this example, a per-particle field attribute is added to the particle shape and set using simple Creation Rules. The expressions that set the per-particle attributes also illustrate the difference between the rand and noise functions.

- Select the Dynamics Menu.
- Create a nurbs plane that is 100 units wide.
- Make the selected nurbs plane live.
- Now select the Particle Tool and using Sketch Particles with interval of 18, paint some particles on the plane as shown in Figure 1.





- Set the Particle Render Type to Spheres with a radius of 0.5.
- Add the radiusPP per-particle attribute.
- With the particle object selected add a uniform field with these settings:

Figure 2.

<ul> <li>Uniform Field Attribut</li> </ul>	es		
Magnitude	2.000		-1
Attenuation	0.000		
Direction	1.000	0.000	0.000

When the simulation plays, all the particles move across the plane at the same speed.

The objective is to vary the size of the particle spheres and then create a per-particle attribute for the uniform field magnitude that will cause the larger particle spheres to move faster across the plane.

From the particle shape attribute editor, right-click on the radiusPP entry and select Creation Expressions. This will open the Expression Editor. Enter the expression shown in Figure 3.

Expression Ed	
Select Filter Object	Filter Attribute Filter Insert Functions Help
	Editing Particle Expression
Expression Name	particleShape1 New Expression
	INEW Expression
Selection	410-70-40-0
Objects particleShape1	Attributes dieOnEmissionVolumeExit
particiconapor	lifespanMode 🔤
	lifespanRandom expressionsAfterDynamics
	isDynamic dynamicsWeight
Selected Obj & Attr:	particleShape1
Default Object:	
	C All C None C Angular only
Particle:	C Runtime before dynamics     C Runtime after dynamics     C Creation
Evaluation:	Always
E ditor:	Expression Editor
Expression:	
particleShape	1.radiusPP = particleShape1.radius * rand(1,5);
<b>5</b> 10	
Edit	Delete Reload Clear Close
	top

Figure 3.

There is a problem. Each time the animation plays, the particle radiusPP changes. In order to have the rand function return the same values each time the scene is played, the seed function must be called first. Insert this expression before the assignment of radiusPP:

seed(particleShape1.particleId);

Now the sphere radius' do not change each time the animation is re-played.

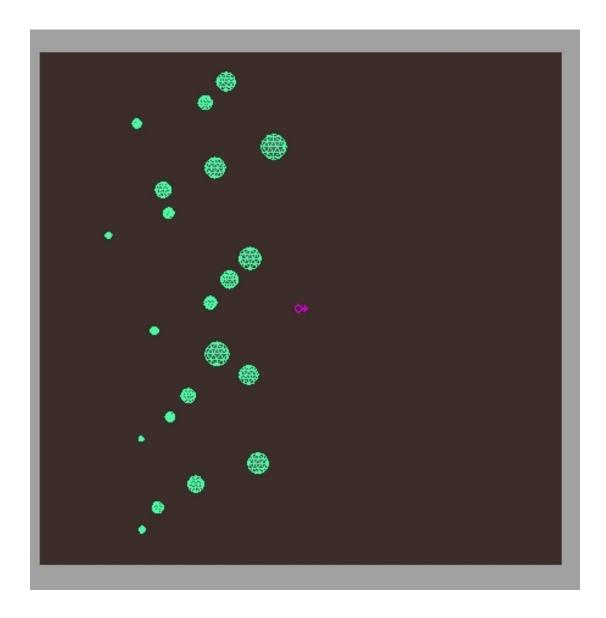
Add the per-particle attribute, uniformField1\_magnitude and enter these expressions:

Figure 4.

🔯 Expression Editor
Select Filter Object Filter Attribute Filter Insert Functions Help
Editing Particle Expression
Expression Name particleShape1 New Expression
▼ Selection
Objects Attributes
particle1       ageCache         particleShape1       inputGeometryPoints         deformedPosition       lifespanPP         radiusPP       uniformField1_magnitude
Selected Obj & Attr: particleShape1.uniformField1_magnitude
Default Object:
Convert Units: 🖸 All 🔹 🔿 None 🔹 🔿 Angular only
Particle: C Runtime before dynamics C Runtime after dynamics 📀 Creation
Evaluation: Always
Editor: Expression Editor 💌
Expression:
<pre>seed(particleShape1.particleId); vector \$pos = particleShape1.position; float \$noiseFactor = 0.5*noise(\$pos.z); particleShape1.radiusPP = particleShape1.radius * rand(1,5); particleShape1.uniformField1_magnitude = particleShape1.radiusPP + \$noiseFactor;</pre>
Edit Delete Reload Clear Close

To create interesting variation in the particle movement a noise factor is added to radiusPP for the assignment to uniformField1\_magnitude. The noise is based on the z position which means the noise values of particles close in z will be similar to each other.

Figure 5.



Question: What is the difference in behavior between the rand and noise function ?

Question: Which field is affected by the particle's mass?

Assignment: Either using the same field or another connected field, setup a different per-particle field attribute and demonstrate its behavior. Also provide at least one example of a visual effect where the per-particle field attribute improves the realism and/or appearance of the effect.