Chapter 8
3D Object Representations

Myung-Soo Kim
Seoul National University
http://cse.snu.ac.kr/mskim
http://3map.snu.ac.kr

Particle Systems

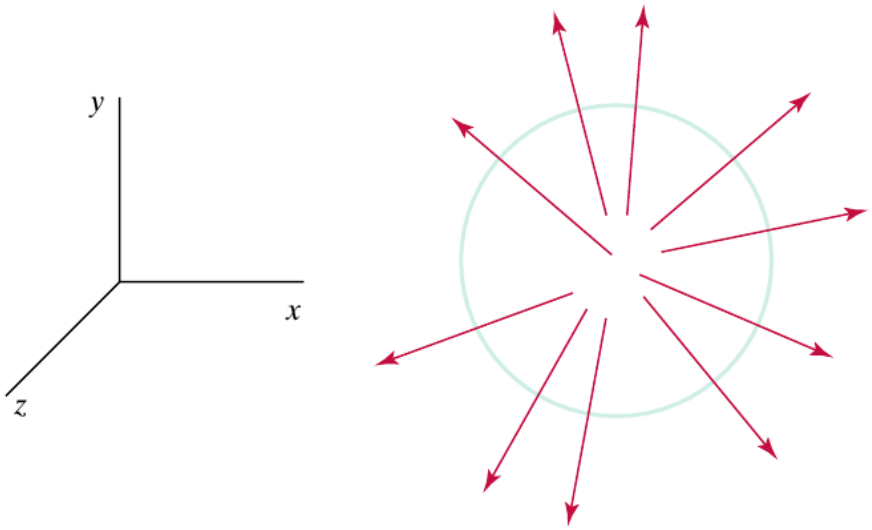

FIGURE 8–113 Modeling fireworks as a particle system with particles traveling radially outward from the center of a sphere.

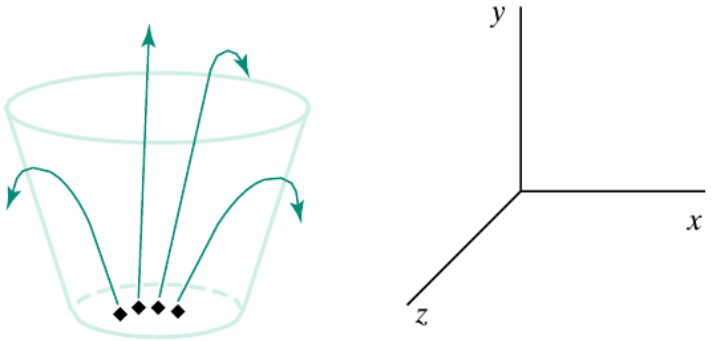

FIGURE 8–114 Modeling a clump of grass by firing particles upward within a tapered cylinder. The particle paths are parabolas due to the downward force of gravity.

Particle Systems

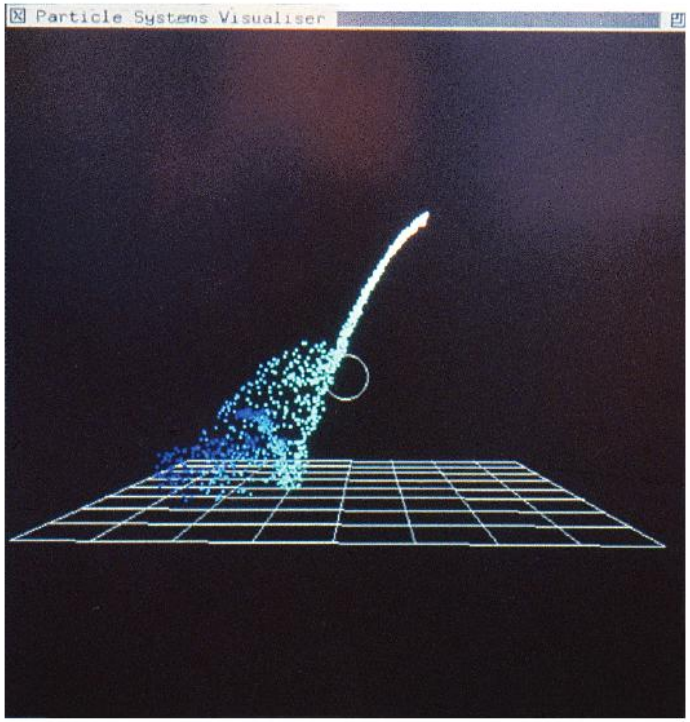

FIGURE 8-115 Simulation of the behavior of a waterfall hitting a stone (circle). The water particles are deflected by the stone and then splash up from the ground. (*Courtesy of M. Brooks and T. L. J. Howard, Department of Computer Science, University of Manchester.*)

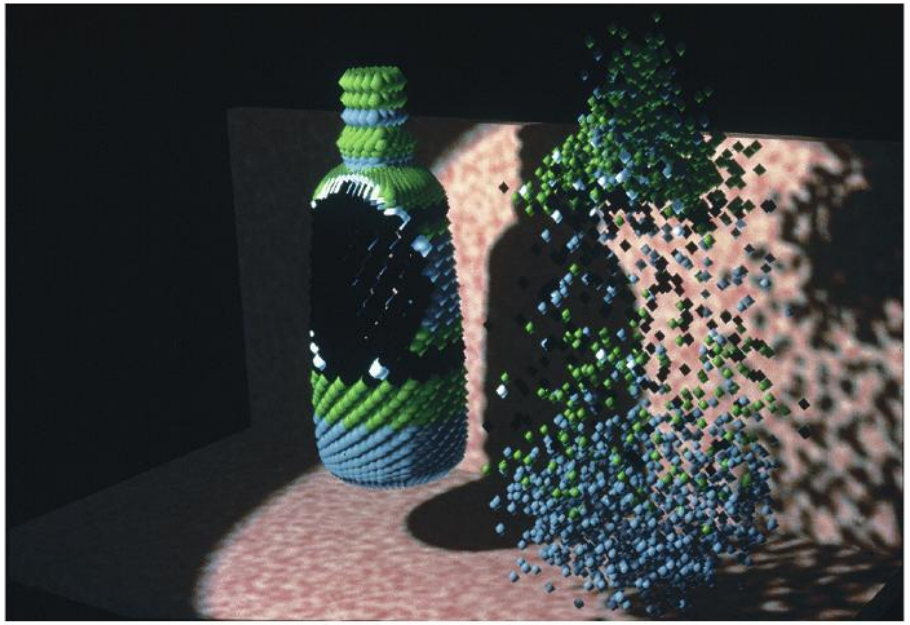

FIGURE 8-116 An object disintegrating into a cloud of particles. (*Courtesy of Autodesk, Inc.*)

Physically-Based Modeling

$$F_s = -F_x = -kx$$

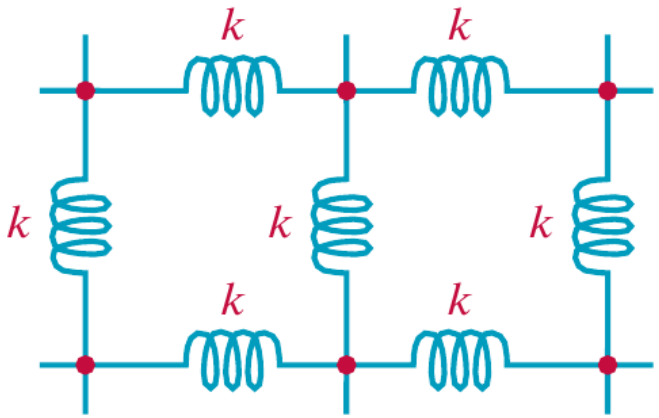

FIGURE 8-118 A two-dimensional spring network, constructed with identical spring constants k.

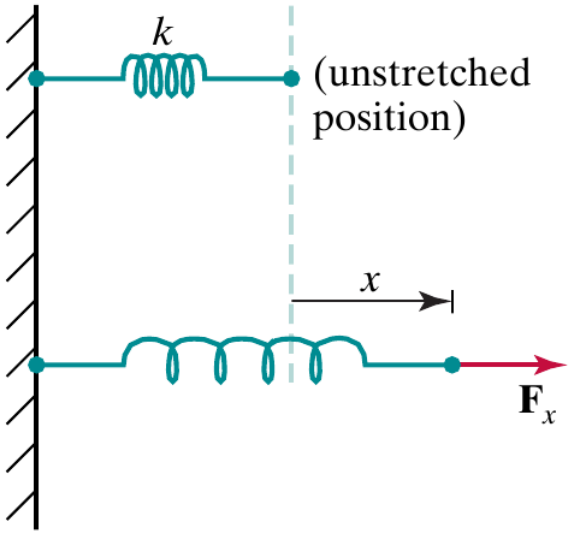

FIGURE 8-119 An external force F_x pulling on one end of a spring, with the other end rigidly fixed.

Physically-Based Modeling

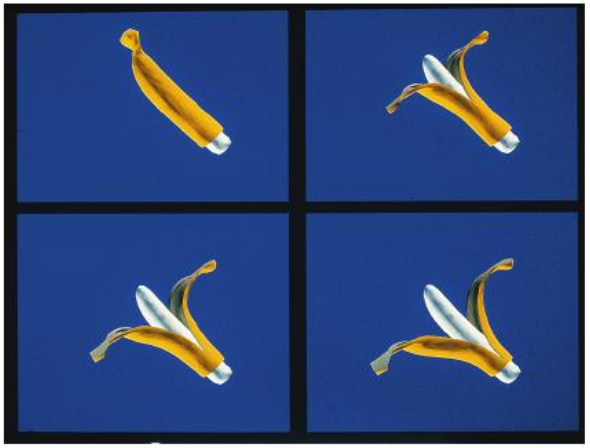

FIGURE 8-120 Modeling the flexible behavior of a banana peel with a spring network. (*Courtesy of David Laidlaw, John Snyder, Adam Woodbury, and Alan Barr, Computer Graphics Lab, California Institute of Technology.* © *1992.*)

FIGURE 8-121 Modeling the flexible behavior of cloth draped over furniture using energy-function minimization. (*Courtesy of Gene Greger and David E. Breen, Design Research Center, Rensselaer Polytechnic Institute.* © *1992.*)

(a) (b) (c)

FIGURE 8-122 Modeling the characteristics of (a) cotton, (b) wool, and (c) polyester cotton using energy-function minimization. (*Courtesy of David E. Breen and Donald H. House, Design Research Center, Rensselaer Polytechnic Institute.* © *1992.*)