

CS633 3D Computer Animation

Homework Assignment 6 (40 points)

Due: 4/19/2018

1. Given the following two primitive implicit surfaces

$$f_1(p) = (x - 2)^2 + (y - 0)^2 + (z - 0)^2 - 1$$

$$f_2(p) = (x + 2)^2 + (y - 0)^2 + (z - 0)^2 - 1$$

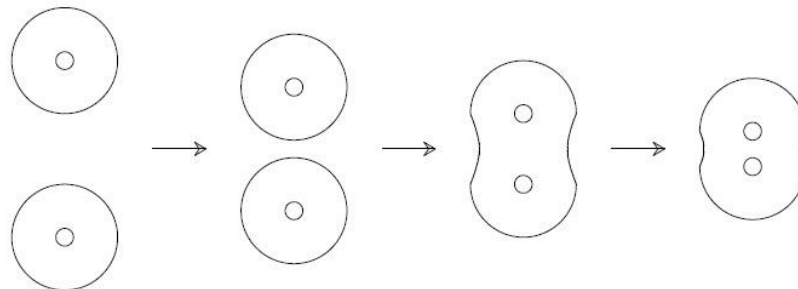
what is the shape of the implicit surface

$$F(p) = \sum_{i=1}^2 w_i f_i(p) - T$$

when (a) $w_1 = w_2 = 1$ and $T = 4$; (b) $w_1 = w_2 = 1$ and $T = 2$; (c) $w_1 = -w_2 = 1$ and $T = 6$; (d) $w_1 = -w_2 = 1$ and $T = 4$.

Use 2D examples to illustrate your results. (10 points)

2. One technique to model the merging of two water drops

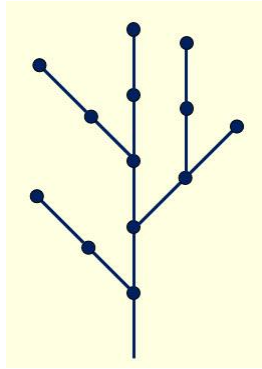


Is to use the following implicit function

$$F(x, y) = \sum_{i=1}^2 \frac{1}{(x - x_i)^2 + (y - y_i)^2} - 1$$

where (x_1, y_1) is the center point of the first water drop and (x_2, y_2) is the center point of the second water drop. Can this technique be extended to cover the merging of three water drops or even four and five water drops? Why or why not. Justify your answer. (10 points)

3. Find the terminal string whose corresponding graphics produced by the turtle interpretation is as follows. See slides 15 -17 of the notes: "Special Models for Animation II" for the definitions of F, +, -, [, and]. (10 points)



4. For the example (Fractal plant) given in slide 34 of the notes: “Special Models for Animation II”, show the corresponding graphics produced by the turtle interpretation when $n=3$. (10 points)