Lecture No 33 Topic: 2. Superellipsoids

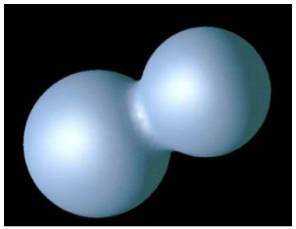
- These and other superquadric shapes can be combined to create more complex structures, such as furniture, threaded bolts, and other hardwar

$$\left[\left(\frac{x}{r_x}\right)^{2/s_2} + \left(\frac{y}{r_y}\right)^{2/s_2}\right]^{s_2/s_1} + \left(\frac{z}{r_z}\right)^{2/s_1} = 1$$

Blobby objects

- Some objects do not maintain a fixed shape
- They change their surface characteristics in certain motions
- These objects are referred to as blobby objects, since their shapes show a certain degree of fluidity
- Examples in this class of objects include 1. water droplets 2. melting objects 3. muscle shapes in the human body

$$f(x, y, z) = \sum_k b_k e^{-a_k r_k^2} - T = 0$$



Geometric modeling

- Wireframe modeling
- Surface modeling
- Solid modeling

Why Geometric modeling is needed

- Geometric (3D) models are easier to interpret.
- Simulation under real-life conditions.
- Less expensive than building a physical model.
- 3D models can be used to perform finite element analysis (stress, deflection, thermal)
- 3D models can be used directly in manufacturing, Computer Numerical Control (CNC).
- Can be used for presentations and marketing.

Wireframe Modeling

- Wire-frame modelling uses points and curves (i.e. lines, circles, arcs) to define objects.
- The user uses edges and vertices of the part to form a 3-D object