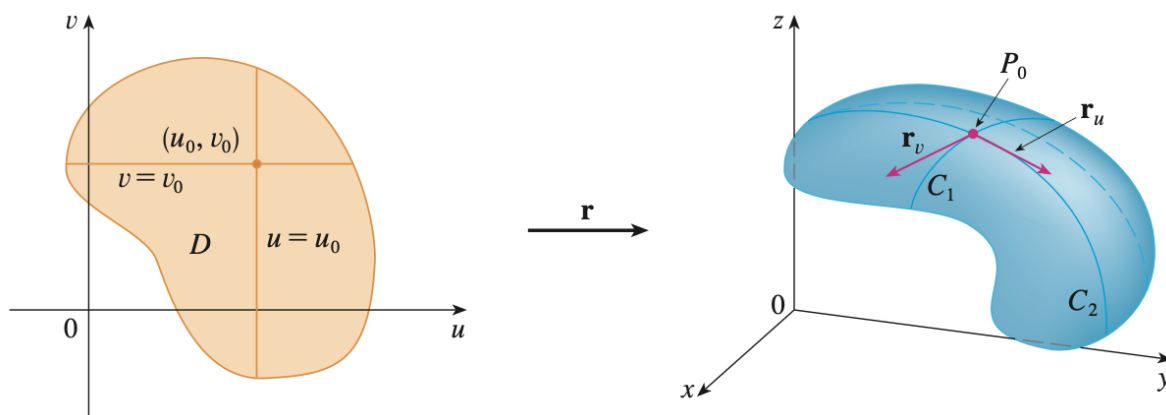


12.6 Surface Area

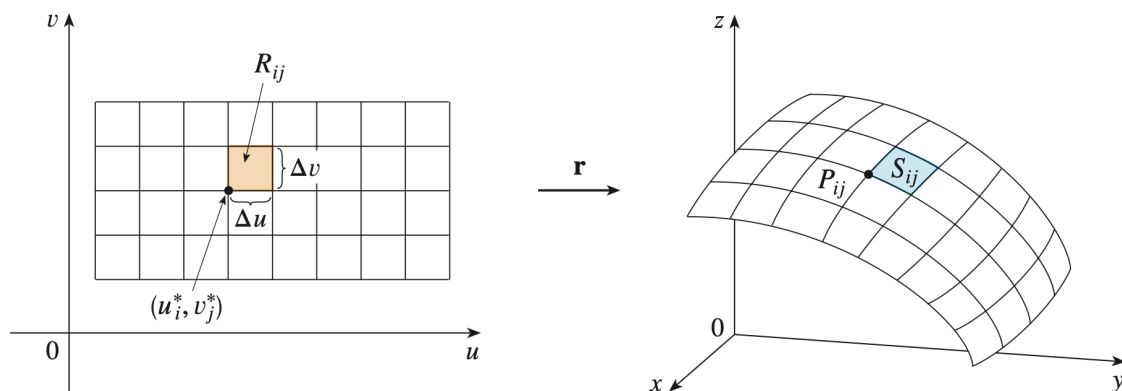
Question. Recall that a parametric surface S is defined by a vector-valued function of two parameters

$$\vec{r}(u, v) = \langle x(u, v), y(u, v), z(u, v) \rangle$$

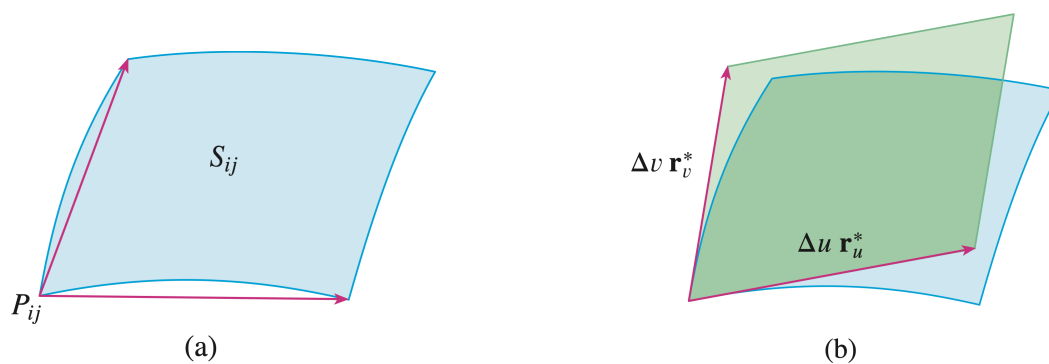
How will we find the area of S ?



Question. What is a patch?



Question. How can the two edges of the patch that meet at P_{ij} can be approximated by vectors? What is the approximate area of the patch?



Definition. If a smooth parametric surface S is given by the equation

$$\vec{r}(u, v) = \langle x(u, v), y(u, v), z(u, v) \rangle$$

for $(u, v) \in D$, and S is covered just once as (u, v) ranges throughout the parameter domain D , what is the surface area of S ?

Example. Find the surface area of a sphere of radius a .

Example. How can we find the surface area of a surface S with equation $z = f(x, y)$, where (x, y) lies in D and f has continuous partial derivatives.

Example. Find the area of the part of the paraboloid $z = x^2 + y^2$ that lies under the plane $z = 9$.

