

MA 323 Geometric Modelling

Course Notes: Day 29

Correction to Notes

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There is an error in the notes, when considering the joining of three rectangular patches as in the diagram below.

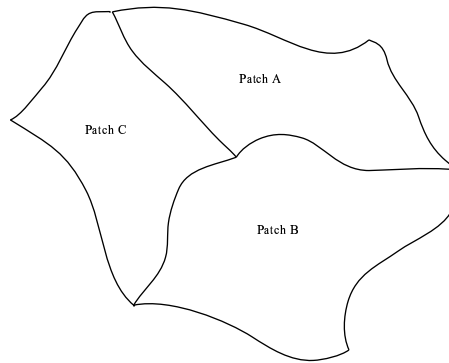


Figure 1: Joining three patches in a irregular rectangular grid

If the patches are bicubic then to join the patch continuously, we need the following compatibility conditions.

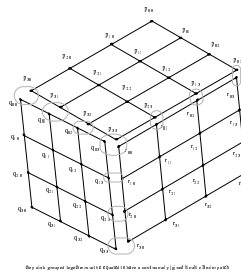


Figure 2: Compatibility conditions for a continuous joining

For C^1 joining across the boundaries, where we want C^1 joining across each common edge, it is necessary that the surface be singular in the sense that there is no well-defined normal vector by $\partial X/\partial u \times \partial X/\partial v = \mathbf{0}$ at common corner. The three nearest interior points to the common corner must coincide for a C^1 joining. This allows implies that the nearest points to the common corner point on the boundary must also coincide, so that the patch is singular. To see this consider the diagram below.

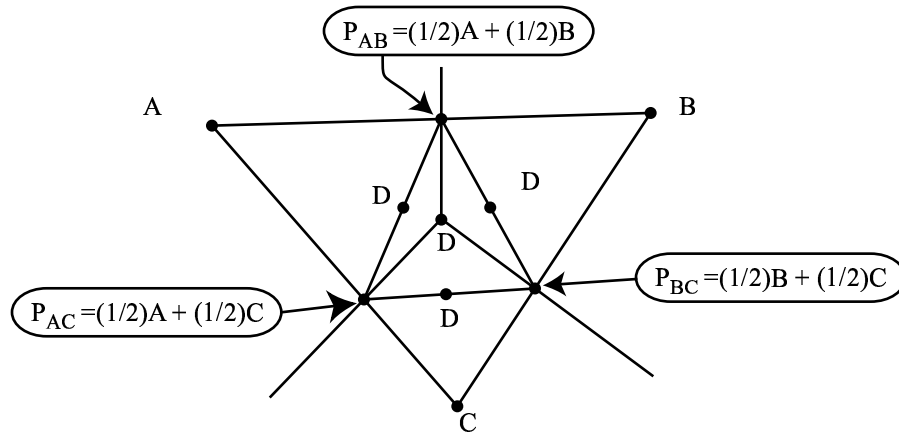


Figure 3: Compatibility conditions for a smooth joining

The four points labelled D in the above diagram must coincide as the common corner point. The corner point must be the midpoint of the line segments $P_{AB}P_{BC}$ and $P_{AC}P_{AB}$ and $P_{AC}P_{BC}$. Now, since the midpoints of the sides of a triangle can only coincide if the lengths of the sides equals zero. This means that $A = B = C$.