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LOCAL FLATNESS OF COMBINATORIAL MANIFOLDS IN CODIMENSION ONE[1]

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We derive here a fundamental theorem of Brown [1] from a theorem of Cairns [2].

THEOREM. *If K is a combinatorial n-manifold without boundary rectilinearly embedded in R^{n+1} then K is locally flat in R^{n+1}.*

PROOF. Let x be any point of K and let v be a vertex of K containing x in the interior of its star, $\mathrm{St}(v, K)$. Without loss of generality, we may assume that v is the origin in R^{n+1}. The radial projection Γ of the link, $\mathrm{Lk}(v, K)$, of v in K on S^n is a combinatorial $(n-1)$-sphere in S^n whose cells are geodesic simplexes on S^n. By the main theorem of [2], there is a homeomorphism h of S^n (onto itself) taking $\Gamma(\mathrm{Lk}(v, K))$ onto S^{n-1}. Let h^* denote the radial extension of h to a homeomorphism of R^{n+1}. Then h^* maps $\mathrm{St}(v, K)$ into R^n. Thus K is locally flat in R^{n+1}.

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