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# Ricci surfaces

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A Ricci surface is a Riemannian 2-manifold  $(M, g)$  whose Gaussian curvature  $K$  satisfies  $K \Delta K + g(dK, dK) + 4K^3 = 0$ . Every minimal surface isometrically embedded in  $\mathbb{R}^3$  is a Ricci surface of non-positive curvature. At the end of the 19th century Ricci-Curbastro has proved that conversely, every point  $x$  of a Ricci surface has a neighborhood which embeds isometrically in  $\mathbb{R}^3$  as a minimal surface, provided  $K(x) < 0$ . We prove this result in full generality by showing that Ricci surfaces can be locally isometrically embedded either minimally in  $\mathbb{R}^3$  or maximally in  $\mathbb{R}^{2,1}$ , including near points of vanishing curvature. We then develop the theory of closed Ricci surfaces, possibly with conical singularities, and construct classes of examples in all genera  $g \geq 2$ .

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