Catenoids, Liouville euqation and the Allen-Cahn equation

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In this work we present a review on existence of new families of axially symmetric entire solutions to the Allen-Cahn equation $\Delta u + u(1-u^2) = 0$ in $\mathbb{R}^N$ for $N \geq 3$. We exhibit a strong connection with the theory of minimal surfaces and the Liouville equation. We give precise information on the asymptotic behavior of the solutions and their Morse Index. This is a joint work with Manuel del Pino from the University of Chile and Jung Cheng Wei from the University of British Columbia.