The Special Lagrangian Potential Equation

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ABSTRACT

This is an equation which Reese Harvey and I found years ago, when we were first working on calibrations. It is a pure second-order differential equation for a scalar function, with the remarkable property that if u is a C^2-solution, then the graph of ∇u

$$\{(x, \nabla u) \in \mathbf{R}^n \times \mathbf{R}^n : x \in \Omega^{\text{open}} \subset \mathbf{R}^n\}$$

is absolutely volume-minimizing in $\mathbf{R}^{2n}$. When $n = 3$, the equation has the very nice form

$$\Delta u \;=\; \det\left(D^2\, u\right).$$

This equation has received much attention over the years.

I will give an introduction to the field and highlight some of the interesting developments including: the Dirichlet Problem, singular solutions, and the relation to mirror symmetry.