The Monge-Ampère Equation With Blow-up Boundary Condition

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Let Ω be a domain in $\mathbb{R}^n$ and ψ a positive function defined on $\Omega \times \mathbb{R} \times \mathbb{R}^n$. We consider the Dirichlet problem for the Monge-Ampère equation

$$\det D^2 u = \psi(x, u, Du) > 0 \text{ in } \Omega, \tag{0.1}$$

with the boundary condition

$$u = +\infty \text{ on } \partial\Omega. \tag{0.2}$$

We will assume ψ to be smooth and look for strictly convex solutions in $C^\infty(\Omega)$; it is necessary to assume the underlying domain Ω to be convex for such solutions to exist. In this work, we find optimal growth conditions under which a solution exists.

Presented by Bo Guan