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GRADIENT ESTIMATES FOR ELLIPTIC EQUATIONS AND SYSTEMS FROM COMPOSITE MATERIAL

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We present some results on gradient estimates for elliptic equations and systems from composite material. The coefficients of the equations and systems are piecewise smooth. Degenerate elliptic equations are allowed. In the elliptic case, the estimates are, even though depending on the size of the surfaces of discontinuity of the coefficients, independent of the distance between these surfaces. The results described in this talk include those in earlier joint works with M. Vogelius (2000), with L. Nirenberg (2003), and recent and ongoing joint works with Ellen ShiTing Bao and Biao Yin which concern degenerate elliptic equations and systems (e.g. the perfect conductivity problem). We will also describe some open problems in this direction.

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