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A Classical Perron Method for Existence of  
Smooth Solutions to Boundary Value and  
Obstacle Problems for Boundary-degenerate  
Elliptic Operators via Holomorphic Maps

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We prove existence of solutions to boundary value problems and obstacle problems for degenerate-elliptic, linear, second-order partial differential operators with partial Dirichlet boundary conditions using a new version of the Perron method. The elliptic operators considered have a degeneracy along a portion of the domain boundary which is similar to the degeneracy of a model linear operator identified by Daskalopoulos and Hamilton (1998) in their study of the porous medium equation or the degeneracy of the Heston operator (Heston, 1993) in mathematical finance. Our Perron method relies on weak and strong maximum principles for degenerate-elliptic operators, concepts of continuous subsolutions and supersolutions for boundary value and obstacle problems for degenerate-elliptic operators, and maximum and comparison principle estimates previously developed by us.