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**Julian Edward\*** ([edwardj@fiu.edu](mailto:edwardj@fiu.edu)), Department of Mathematics and Statistics, Florida International University, Miami, FL 33199, and **Steve Hudson** and **Mark Leckband**. *Existence problems for the  $p$ -Laplacian: Dirichlet and Neumann boundary conditions.*

The authors consider a number of boundary value problems involving the  $p$ -Laplacian. The model case is  $-\Delta_p u = V|u|^{p-2}u$  for  $u \in W^{1,2}(D)$  with  $D$  a bounded domain in  $\mathbf{R}^n$ . The function  $u$  is assumed to satisfy either Dirichlet boundary conditions or appropriately formulated Neumann boundary conditions. We derive necessary conditions for the existence of nontrivial solutions. These conditions usually involve a lower bound for a product of powers of the norm of  $V$ , the measure of  $D$ , and a sharp Sobolev constant. In most cases, these inequalities are best possible. (Received February 07, 2014)