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Let  $\Omega$  be a domain in  $\mathbf{R}^n$  with  $0 \in \partial\Omega$ . Suppose in  $B$ , the unit ball in  $\mathbf{R}^n$ ,  $u$  and  $\Omega$  satisfy the following equation in the sense of distributions:

$$\begin{aligned} Lu &= \chi_\Omega \text{ in } B \\ D^\alpha u &= 0 \text{ for } |\alpha| \leq 3 \text{ in } B \setminus \Omega. \end{aligned}$$

Here  $L$  is a homogeneous fourth order elliptic operator and  $\chi_\Omega$  denotes the characteristic function. We analyze the regularity properties of  $u$ . (Received September 25, 2012)