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**Overdetermined Boundary Value Problems,
Quadrature Domains and Applications**

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Abstract. We discuss an overdetermined problem in planar multiply connected domains Ω . This problem is solvable in Ω if and only if Ω is a quadrature domain carrying a solid-contour quadrature identity for analytic functions. At the same time the existence of such quadrature identity is equivalent to the solvability of a special boundary value problem for analytic functions. We give a complete solution of the problem in some special cases and discuss some applications concerning the shape of electrified droplets and small air bubbles in a fluid flow.

Keywords. Overdetermined boundary value problem, quadrature domain, analytic function, quadratic differential.

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