

# Recent Advances Involving Double-Layer Potentials Associated with a Certain Generalized Bi-Axially Symmetric Helmholtz Equation

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## Abstract

Various classes of double-layer potentials are known to play an important rôle in solving boundary value problems for elliptic equations. In our presentation here, we introduce and investigate some families of double-layer potentials which are associated with a certain generalized bi-axially symmetric Helmholtz equation. By using several properties of multivariable hypergeometric functions (and, especially, of one of Appell's hypergeometric functions in two variables), we prove limiting theorems and derive integral equations concerning a denseness of double-layer potentials.

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**Key Words and Phrases.** Singular partial differential equations; Whittaker functions; Multivariable hypergeometric functions; Lauricella's hypergeometric functions in  $n$  variables; Horn's and Appell's hypergeometric functions in two variables; Generalized bi-axially symmetric Helmholtz equation; Degenerated elliptic equations; Generalized axially symmetric potentials; Double-layer potentials.