
# A Simplified Three dimensional boundary Element method with subsonic uniform flow

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The presence of the flow in axisymmetric acoustic radiation and propagation problems shows that the boundary integral formulation developed in literature becomes signifcantly more complicated than in the no-flow case because containing the convection terms of the normal derivative and the flow direction derivative for the convected modal Green's function. To obtain a formulation that is less complicated, we develop in this paper a new analysis method and numerical development of the direct boundary element method formulation for axisymmetric acoustic radiation and propagation problems in a subsonic uniform flow. This formulation is based on the axisymmetric convected Helmholtz equation, the convected modal Green's function, the Fourier coefficient of the three- dimensional convected Green's function in cylindrical coordinates system, independently of the explicit choice of the flow direction arising from the Helmholtz operator by the Prandtl-Glauert transformation and is expressed only in two new terms, one concerning the particular normal derivative similar to the particular temporal derivative and the other concerning the non-standard normal derivative reduce the convection terms of the convected modal Green's function adapted to the analytical resolution method and classical numerical implementation.