Variational Principles for Inverse Problem of 2-D Transonic Rotational Flow Using Pseudo-Potential Function

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Abstract

Based on the variational principles (VP) for the direct problem in a previous paper, we extend them to the inverse problem of 2-D transonic rotational flow. Making use of the powerful tool the functional variation with variable domain, all boundary conditions including those on the unknown walls are converted into natural ones. Thus, a rigorous and sound theoretical basis for the finite element solution of the inverse shape design problem in aerodynamics is founded.