

Generating series solutions to flow over topography in real time

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Analytic series methods have recently been used to determine accurate solutions to nonlinear fluid flow over topography. These methods are iterative schemes that update an initial estimate of the free boundary location using a cost function. Solutions are obtained efficiently and accurately with exact error bounds immediately available. The success of a solution method depends on its efficiency and precision. In this paper, we introduce techniques that improve the computational time by an order of magnitude without any loss of accuracy. We will demonstrate this efficiency by generating two dimensional solutions to subcritical flow over topography in real time.