Computation of stabilization parameters by deep learning

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In convection-dominated regimes, traditional stabilization methods often encounter significant drawbacks: they are either computationally expensive or induce numerical oscillations. In this work, we propose a novel approach that integrates a machine learning model to predict a better stabilization parameter than the standard one used in SUPG. Our methodology employs a neural network that extracts important local features of the problem from a coupled SUPG-Tabata framework, predicting a more appropriate stabilization parameter for the SUPG method. This approach not only aims to reduce computational cost but also mitigates oscillatory inaccuracies, ultimately enhancing the reliability of numerical simulations in convection-dominated environments.

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