A Better Nondimensionalization Scheme for Slender Laminar Flows: The Laplacian Operator Scaling Method[1] MARK WEISLOGEL, YONGKANG CHEN, DANIEL BOLLEDDULA, Portland State University — A scaling of the 2-D Laplacian operator is demonstrated for certain solutions (at least) to Poisson's equation. It succeeds by treating the operator as a single geometric scale entity. The belated and rather subtle method provides an efficient assessment of the geometrical dependence of the problem and is preferred when practicable to the hydraulic diameter or term-by-term scaling for slender fully developed laminar flows. The improved accuracy further reduces the reliance of problems on widely varying numerical data or cumbersome theoretical forms and improves the prospects of exact or approximate theoretical analysis. Simple example problems are briefly described that demonstrate the application and potential of the method.

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