A COMPUTATIONAL STUDY OF DATA ASSIMILATION FOR A REACTION-DIFFUSION EQUATION

ADAM LARIOS AND COLLIN VICTOR

ABSTRACT. Abstract goes here. (Don't write until we are finished.)

1. INTRODUCTION

Introduction goes here. (Don't write until we are finished.)

2. PRELIMINARIES

Preliminaries section. Put basic lemmas, theorems, and definitions here (i.e., the ones we are going to cite).

Introduce Data Assimilation, the Chaffee-Infante equation, the Eyre convex splitting method

3. MAIN SECTION

Main theorems, proofs, and other results go here.

Uniform Static Grid. From 3.1 it seems that the minimum number of nodes can be approximated by

$$M = \frac{1}{4}\nu^{-\frac{1}{2}}.$$

In the worst-case scenario, it seems reasonable that n_b "blobs" are distributed uniformly across the domain. The number of nodes required for data assimilation to capture all of blobs is approximately $2n_b$, or equivalently $n_b = \frac{M}{2}$.
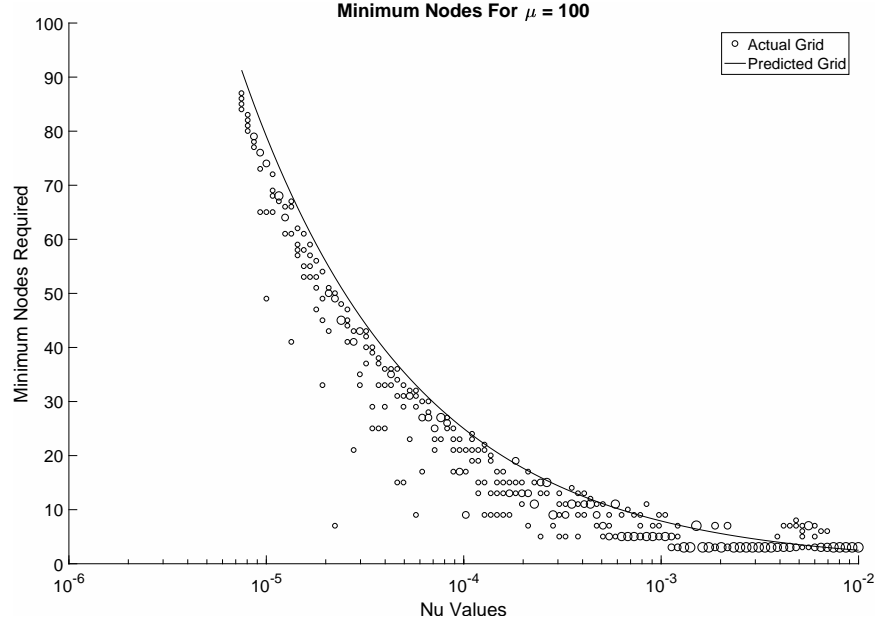

FIGURE 3.1. Minimum number of nodes required for convergence

The minimum length of each bump λ is given by the following:

$$
\begin{aligned}
\lambda &= \frac{L}{n_b}, \\
&= \frac{2L}{M}, \\
&= \frac{2L}{\frac{1}{4}\nu^{-\frac{1}{2}}}, \\
&= 8L\sqrt{\nu}.
\end{aligned}
$$

By only using data assimilation, we have a heuristic argument for this inverse problem.

Data Assimilation by a Sweeping Probe. Interestingly, the minimum number of nodes required for data assimilation by a sweeping probe was not uniform. The values changed depending on the value of μ, as can be seen by 3.3

ACKNOWLEDGEMENT

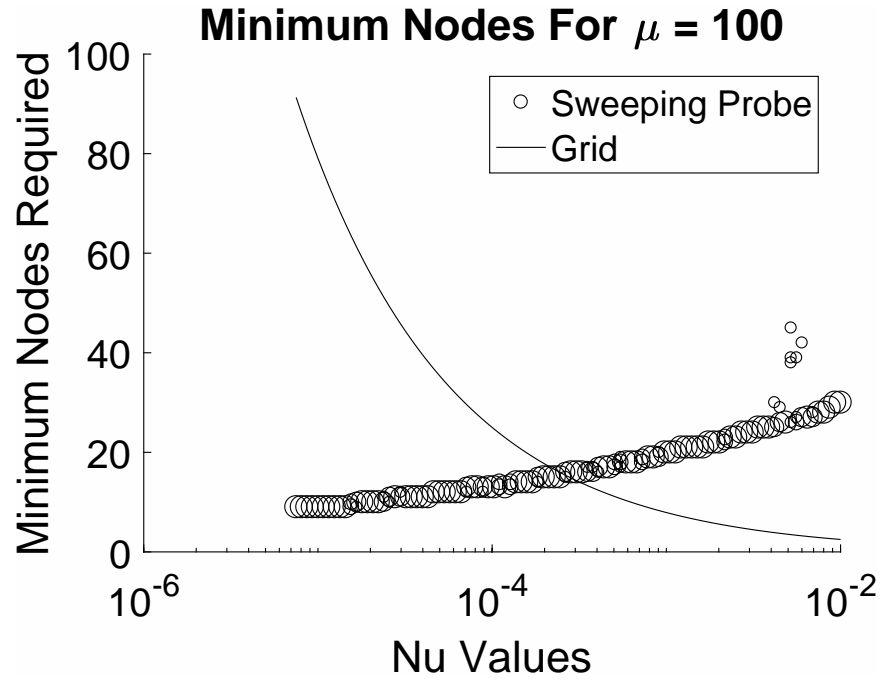## Minimum Nodes For μ = 100

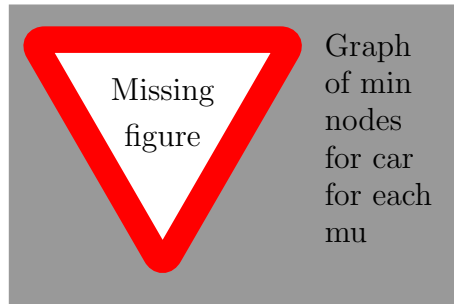FIGURE 3.2. Minimum number of nodes required for convergence for a sweeping probe with $\mu = 100$

FIGURE 3.3. Minimum number of nodes required for convergence for a sweeping probe

REFERENCES

(Adam Larios) DEPARTMENT OF MATHEMATICS, UNIVERSITY OF NEBRASKA–LINCOLN, LINCOLN, NE 68588-0130, USA
  E-mail address, Adam Larios: `alarios@unl.edu`

(Collin Victor) DEPARTMENT OF MATHEMATICS, UNIVERSITY OF NEBRASKA–LINCOLN, LINCOLN, NE 68588-0130, USA