

# Testing a new algorithm for isometric embedding of black hole horizons

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## Abstract

Isometric Embedding is a classic problem in differential geometry and general relativity that involves constructing a surface in Euclidean space described by a metric tensor. The results from this problem have a long history for visualization, but are also relevant for calculating quantities like black hole mass and energy. Unfortunately, in general scenarios, this problem requires a solver capable of handling a system of strongly nonlinear and nonstandard PDEs, for which there is no generally established algorithm. We have explored a radically new approach to the embedding problem, applying it to a variety of specific test cases and confirming that the results converge as expected and agree with results obtained analytically and by other algorithms. This poster presents the results of a finite-difference-based C++ code that we have written to implement and test this novel algorithm.

## Introduction

## Numerical Method

## Future Work

## Conclusion

## Convergence Tests

## Application to BBHS

## References