An Introduction to a C++ Library AFEPack and Its Applications

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As an important part of the development of computational science, the research on numerical methods for partial differential equations and the development of related numerical software are playing a significant role in scientific exploration and engineering applications. This report will systematically introduce a general-purpose C++ numerical library for the numerical solution of partial differential equations, called AFEPack, including its design philosophy, underlying data structures and algorithms, and class implementation. In addition, the report will detail the implementation of a locally refined mesh adaptive method in AFEPack, including a mesh management module based on a type of geometric genetic tree and the design of error indicators. Finally, the report will demonstrate the potential applications of the numerical library in fields such as computational fluid dynamics.

References:
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