SPACE–TIME FINITE AND BOUNDARY ELEMENT METHODS FOR PARABOLIC PROBLEMS

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Abstract. In most cases, finite and boundary element methods for time–dependent partial differential equations rely on time–stepping schemes. Although such an approach allows for a subsequent solution of the discrete system, it may not reflect the behavior of the solution properly, at least from an approximation point of view. For the model problem of the heat equation we will consider finite and boundary element methods with respect to general decompositions of the space–time domain and its boundary into finite and boundary elements, respectively. In particular, such an approach allows for an adaptive refinement simultaneously in space and time. Moreover, the global solution of the overall space–time system can be done in parallel, in contrast to more standard time discretization schemes. Here we will present a stability and error analysis of space–time finite and boundary element methods, and we present some numerical results which indicate the potential of the proposed approach.

Keywords: heat equation, finite elements, boundary elements

Mathematics Subject Classifications (2010): 65M38, 65M60

References

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