

## PIECEWISE BILINEAR PRECONDITIONING OF HIGH-ORDER FINITE ELEMENT METHODS\*

SANG DONG KIM<sup>†</sup>

**Abstract.** Bounds on eigenvalues which are independent of both degrees of high-order elements and mesh sizes are shown for the system preconditioned by bilinear elements for high-order finite element discretizations applied to a model uniformly elliptic operator.

**Key words.** multigrid, high-order finite element methods, piecewise linear preconditioning

**AMS subject classifications.** 65F10, 65M30

---

\*Received April 3, 2006. Accepted for publication January 1, 2007. Recommended by T. Manteuffel. This work was supported by KRF R02-2004-000-10109-0 (KOSEF C00006).

<sup>†</sup>Department of Mathematics, Kyungpook National University, Daegu 702-701, Korea (skim@knu.ac.kr).