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ON SYMMETRIC PYRAMIDAL FINITE ELEMENTS

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Abstract. We introduce two kinds of mortar pyramidal finite elements that have several symmetries and do not produce an artificial anisotropy. They are designed to generate continuous piecewise polynomial functions over face-to-face meshes, which contain tetrahedral and block elements.

Keywords. finite element method, composite elements, three-dimensional mortar elements.

AMS (MOS) subject classification: 65N30.

1 Introduction

Pyramidal elements are used for a face-to-face connection of tetrahedral finite elements with hexahedral elements (see Figure 1.1). It is a very useful tool for joining 3D tetrahedral meshes with hexahedral meshes. It has many practical applications in the conforming finite element discretization of complex domains with part of those domains decomposed by hexahedra (see Figure 1.2).

It is true that in special cases a tetrahedron can be connected with a hexahedron via a triangular prism (see Figure 1.3). However, since prismatic

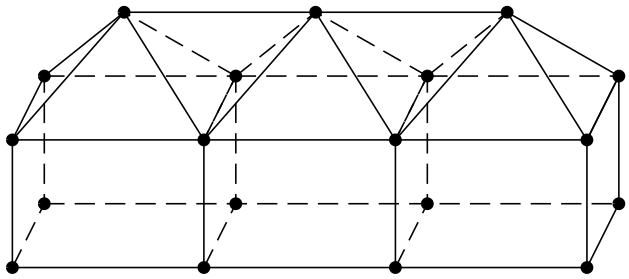

Figure 1.1