A weakened weak (W²) form and a G space ^{†*}M. Li¹

¹College of Mathematics, Taiyuan University of Technology, China

*Presenting author: m13653600949@126.com †Corresponding author: m13653600949@126.com

Abstract

This paper represents some basic mathematic theories for G^s spaces of functions that can be used for weakened weak (W²) formulations, upon which the smoothed finite element methods (S-FEMs) and the smoothed point interpolation methods (S-PIMs) are based for solving mechanics problems. We first introduce and prove properties of G^s spaces, such as the upper boundedness and convergence of the norms, which are in contrast with H¹ spaces. We then prove the equivalence of the G^s norms and its corresponding semi-norms. These mathematic theories are important and essential for the establishment of theoretical frame and the development of relevant numerical approaches. Finally, we apply S-FEM models to solve some practical problems with large deformations.

Keywords: G^s spaces; weakened weak formulations; smoothed finite element methods; mathematic theories; G^s norms; properties of G^s spaces.