

New frames of Besov and Triebel-Lizorkin spaces¹

Dachun Yang

(Communicated by Hans Triebel)

2000 Mathematics Subject Classification. 46E35.

Keywords and phrases. Besov spaces, Triebel-Lizorkin spaces, frames, quark, entropy number.

Abstract. Let $s < 0$. The author obtains some new frames for Besov spaces $B_{pq}^s(\mathbb{R}^n)$ with $1 \leq p, q \leq \infty$ and Triebel-Lizorkin spaces $F_{pq}^s(\mathbb{R}^n)$ with $1 < p < \infty$ and $1 < q \leq \infty$ by a dual method via the subatomic characterizations of these spaces when $s > 0$.

1. Introduction

Subatomic (or quarkonial) characterizations for spaces $B_{pq}^s(\mathbb{R}^n)$ and $F_{pq}^s(\mathbb{R}^n)$ are proved to be a very useful tool in many applications. For example, in [7, 8], Triebel obtained the estimates of entropy numbers for the compact embedding between Besov and Triebel-Lizorkin spaces on bounded domains in \mathbb{R}^n by first establishing the subatomic characterizations of these spaces. These characterizations are essential different from the atomic characterizations in that the subatoms are independent of any given f , but the atoms do. Thus, the atomic decomposition characterizations are not enough in some applications. In fact, the set of subatoms can be regarded

¹Supported in part by the Alexander von Humboldt Foundation of Germany and by both the NNSF (No. 10271015) and the RFDP (No. 20020027004) of China.