

*Parts of biframes and a categorical approach to BiFrm*

The most studied pointfree approach to bitopological spaces was presented by Banaschewski, Brummer and Hardie in [1]. There pointfree bitopological spaces are *biframes*. Biframes consist of three frames  $L = (L_0, L_1, L_2)$  where  $L_1$  and  $L_2$  are subframes of the  $L_0$  and their union  $L_1 \cup L_2$  forms a subbasis of  $L_0$ . They form the category BiFrm of biframes together with biframe homomorphisms  $h: L \rightarrow M$ , which are given by frame homomorphisms  $h: L_0 \rightarrow M_0$  such that they restrict to frame homomorphisms  $f_0|_{L_i} = f_i: L_i \rightarrow M_i$  for  $i = 1, 2$ .

The aim of this talk is explore the notion of subspace of pointfree bitopological spaces. In particular, we will show that a biframe homomorphism  $f: L \rightarrow M$  is an extremal epimorphism in BiFrm if and only if both  $f_1$  and  $f_2$  are extremal epimorphisms in Frm and  $f$  is precisely the push-out of  $f_1 \oplus f_2$  along the quotient map  $q_L: L_1 \oplus L_2 \rightarrow L_0$ . Further we will show that they naturally form a lattice. In addition, we will present certain categorical approach to biframes that will be of particular help in our characterization of extremal epimorphisms.

## References

- [1] B. Banaschewski, G. C. L. Brümmer, K. A. Hardie, Biframes and bispaces, *Quaest. Math.* 6 (1983) 13–25.