

The talk will focus on some geometric PDE problems related, via 2-valued functions, to the study of the branch set of branched minimal immersions. Simon and Wickramasekera (2007) showed how to construct a large class of 2-valued solutions in  $C^{1,\mu}$  to the Dirichlet problem for the minimal surface equation provided the boundary data satisfied a 3-fold symmetry condition. I will show that the branch sets of the minimal hypersurfaces they constructed are real analytic submanifolds, which involves proving a general regularity result for 2-valued solutions to elliptic equations. I also extend their existence result, which was specific to the minimal surface equation, to show that there exists 2-valued solutions in  $C^{1,\mu}$  to other elliptic equations and to elliptic systems that preserve the 3-fold symmetry condition.