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Revisiting some results on Almost Perfect Nonlinear functions

We push a little further the study of two recent characterizations of almost perfect nonlinear (APN) functions. We state open problems about them, and we revisit in their perspective a well-known result from Dobbertin on APN exponents. This leads us to a new result about APN power functions and more general APN polynomials with coefficients in a subfield $\mathbb{F}_{2^k}$, which eases the research of such functions. It also allows to construct automatically many differentially uniform functions from them (this avoids calculations for proving their differential uniformity as done in a recent paper, which are tedious and specific to each APN function). Finally we introduce a new representation of the Kasami APN functions in odd dimension and deduce the exact values (with their sign) of two thirds of their Walsh transform values (this latter work is in common with L. Budaghyan, M. Calderini, D. Davidova and N. Kaleyski).