obtained.

Table 1: Optimizer performance for the case of numerical and analytical gradient evaluation

		Numerical Grad			Analitical Grad				
	Ny	#it	t_N	Ξ	#it	t_A	Ξ	S	S_C
Case A	6	14	13,8	25,4	28	10,3	25,4	1,3	1,7
	8	12	5,4	34,3	5	3,5	34,3	1,5	
	10	14	10,2	38,2	4	4,9	38,2	2,1	
	12	16	15,6	40,6	8	12,6	40,6	1,2	
Case B	12	5	194,4	110,8	30	230,9	107,7	0,8	2
	14	6	330,9	123,1	11	132,7	122,9	2,5	
	16	5	343,7	133,7	9	150,4	133,8	2,3	
	18	21	641,6	140,9	9	185,0	140,8	3,5	
Case C	19	4	2086,0	246,2	20	1698,1	249,8	1,2	2
	21	40	3574,6	281,7	14	1410,1	273,9	2,5	
	23	5	2085,2	295,8	11	1370,1	292,5	1,5	
	25	5	5460,9	308,0	9	1417,3	306,5	3,9	

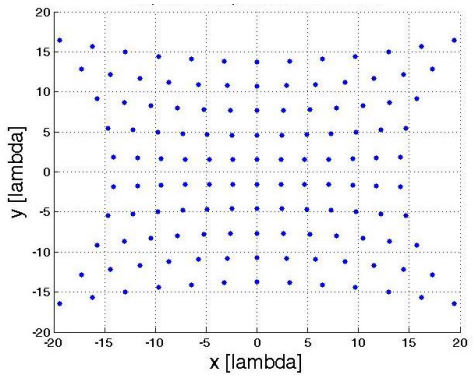

Fig. 2. The locations for the measurement points.

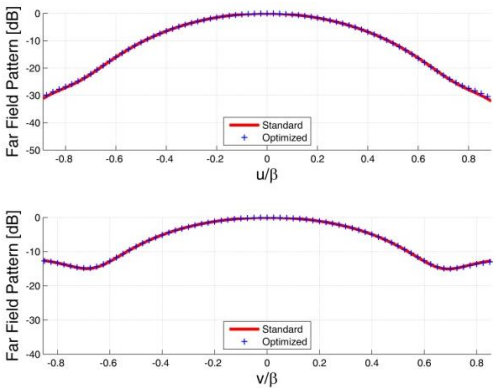

Fig. 3. Cut of the FFP along the u and v axis reconstructed with standard sampling (red line) and with optimized approach (blue cross).

V. CONCLUSIONS

The use of the analytical expression of the gradient evaluation in the optimized NF characterization has been adopted to speed-up the SVB optimization. The analysis show remarkable improvements in terms of computing time when comparing the proposed approach with the one based on the numerical evaluation of the gradient.

REFERENCES

[1] A. D. Yaghjian, "An overview of near field antenna measurements," *IEEE Trans. on Antennas and Propagation*, vol. 34, no. 1, pp. 30-45, 1986.

[2] A. Capozzoli, et al., "Singular value optimization in plane-polar near-field antenna characterization," *IEEE Antennas Prop. Mag.*, vol. 52, no. 2, pp. 103-112, Apr. 2010.

[3] A. Capozzoli, et al., "Field sampling and field reconstruction: a new perspective," *Radio Sci.*, vol. 45, RS6004, pp. 31, 2010.

[4] A. Capozzoli, et al., "NUFFT-accelerated plane-polar (also phaseless) near-field/far-field trans-formation," *Progress In Electromagnetics Research M*, vol. 27, pp. 59-73, 2012.

[5] A. Capozzoli, et al., "Photonic probes and advanced (also phaseless) near-field far-field techniques," *IEEE Antennas Prop. Mag.*, vol. 52, no. 5, pp. 232-241, Oct. 2010.

[6] A. Capozzoli, et al., "Multi-frequency planar near-field scanning by means of SVD optimization," *IEEE Antennas Prop. Mag.*, vol. 53, no. 6, pp. 212-221, Dec. 2011.

[7] A. Capozzoli, et al., "A probe compensated helicoidal NF-FF transformation for aperture antennas using a prolate spheroidal expansion," *Int. J. of Antennas Prop.*, vol. 2012, 2012.

[8] H. J. Landau and H. O. Pollak, "Prolate spheroidal wave functions, Fourier analysis and uncertainty – III: the dimension of essentially time- and band-limited signals," *Bell Syst. Tech. J.*, vol. 41, pp. 1295-1336, 1962.

[9] W. H. Press, et al., *Numerical Recipes in Fortran 77: The Art of Scientific Computing*, Cambridge University Press, 1992.

[10] Matlab User's Manual, http://it.mathworks.com/help/optim/ug/when-the-solver-might-have-succeeded.html

[11] G. H. Golub and C. F. Van Loan, *Matrix Computations*, Baltimore, John Hopkins University Press, 1996.

[12] K. Atkinson and D. D. K. Chien, "A fast matrix-vector multiplication method for solving the radiosity equation," *Adv. in Comput. Math.*, vol. 12, no. 2-3, pp. 151-174, Feb. 2000.

[13] N. S. Bakhvalov, *Numerical Methods*, Mir Publishers, Moscow, 1977.