



جامعة فاروس

## **Publications Template**

#	Research Title	Field	Abstract	Year of Publication Publishing		Publishing Link "UR	L"
1	Design of thinned fractal antenna arrays for adaptive beam forming and sidelobe reduction	Smart Antenna Arrays	This study introduces, for the first time, a new design methodology that combines the unique multi-band features of thinned fractal antenna arrays with the adaptive beamforming requirements. The major challenges of fractal array design are the high sidelobe level (SLL), the huge number of elements at higher- growth stages, and the radiation pattern synthesis. In this study, the ant colony optimisation algorithm is utilised for thinning fractal arrays by estimating the optimum combination of 'on' and 'off' elements corresponding to lowest	2018	https://i map.20	ietresearch.onlinelibrary.wiley.com 17.0464	<u>1/doi/full/10.1049/iet-</u>
	P; Rev. (1 ) Dat	age 1 of 11 e (13-9-2018)	مستوى سرية الوثيَّة: استخدام داخلي Document Security Level = Internal Use	موذجC-V Template	ن	Doc. No. ( <b>PUA–IT–P01–F07</b> ) Issue no.(1) Date <b>(13-9-2018)</b>	





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2	Adaptive beamforming synthesis for	Modern Signal processing	possibl least algorithi as a beamfor the prop capa propo dem investig and per antenr vario regim show th design i in term freque array ele array ele array ele array ele frect propose prom sma te	e SLL, while the mean square m is investigated an adaptive rming method in osed design. The ability of the osed design is onstrated by ating hexagonal ntagonal fractal na arrays under us parameter es. The results at the proposed s much superior s of multi-band ncy operation, ement reduction, oeamforming . This reveals the iveness of the d technique as a ising design in art antenna echnology. ntenna array is a t and multi-band -element design	روس	2017	https://iee	explore.ieee.org/abstract/document/8105131
	thinned fractal antenna arraysTechniques		major cl array	ique. One of the challenges of this ly design is the				
	Page <b>2</b> of <b>11</b>	ستوى سرية الوثيقة: استخدام داخلي	مت	(-V/Templatoz)	, i	Doc. No. (PUA–IT–PO	1–F07)	
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	possibility of radiation		
	pattern synthesis. In this		
	work, the Least Mean		
	Square (LMS) algorithm		
	is investigated as an		
	adaptive beamforming		
	method in the design of		
	thinned fractal antenna		
	arrays for the first time.		
	This array design is		
	developed by estimating		
	the active fractal array		
	elements corresponding		
	to the desired radiation		
	pattern main lobe and		
	nulls, while maintaining		
	the same Side Lobe Level		
	(SLL) at multiple		
	frequency bands. The		
	capability of the		
	proposed method is		
	demonstrated by		
	considering linear cantor		
	and Sierpinski carpet		
	fractal antenna arrays.		
	The results show that the		
	proposed antenna array		
	design is much superior		
	In terms of multi-band		
	array alogent reduction,		
	array element reduction,		
متوى سريه الوتيفة: استخدام داخلي Rev. (2) Date <b>(30-11-2019)</b> Document Security Level = Internal	مه نموذجC-V Template	Issue no.(2) Date (30-11-2019)	

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			accuracy. This reveals the effectiveness of the proposed algorithm as a promising design technique in the smart antenna technology. Unique properties of		
3	<u>Generator</u> optimization for thinned fractal hexagonal and pentagonal antenna arrays using Ant Colony algorithm	Smart Antenna Arrays	fractals are utilized in a new class of antenna- element designs, called fractal antenna arrays that are multi-band and compact in size. This paper investigates the use of Ant Colony Optimization (ACO) algorithm for thinning fractal antenna arrays by estimating the optimum combination of "on" and "off" elements corresponding to lowest possible Side Lobe Level (SLL). The ACO method is employed to determine the suitable excitation amplitude for each element of the subarray generator, allowing maximum SLL reduction. In order to demonstrate the effectiveness of the	2017	https://ieeexplore.ieee.org/abstract/document/7893462
Rev. (2	Page 4 of 11	ىتوى سريـة الوتيقة: استخدام داخلي Document Security Level = Internal	مه نموذجC-V Template	Doc. No. ( <b>PUA-IT-P0</b> Issue no.(1) Date <b>(13-9</b>	9-2018)

4   A new adaptive beamforming environment   Modern Signal processing environment   Modern Signal processing environment   Modern Signal processing environment   Modern proposed method, hexagonal array generator are investigated with and without the ACO method. The ACO results are compared with those obtained for the arrays in which all the elements are turned "on", and the results show the superior performance of the proposed method.     4   A new adaptive beamforming of multiband fractal antenna array in strong-iamming environment   Modern Signal processing requirements in wireless environment with high- jamming power. In this work, a new adaptive beamforming method   https://link.springer.com/article/10,1007/s11277-022-09745-4 article/10,1007/s11277-022-09745-4	P	PHAROS UNIVE ALEXANDR	RSITY IA	Thersity W Marsh	فاروس کندریة	تحامعة الاست
4 A new adaptive beamforming of multiband fractal antenna array in strong-jamming environment Modern This paper proposes, for the first time, a new radiation pattern synthesis for fractal antenna array that combines the unique multi-band characteristics of fractal arrays with the adaptive beamforming Modern Signal processing Techniques https://link.springer.com/article/10.1007/s11277-022-09745-4   2022 environment Signal processing Techniques 2022				proposed method, hexagonal and pentagonal arrays with 6-element concentric circular ring subarray generator are investigated with and without the ACO method. The ACO results are compared with those obtained for the arrays in which all the elements are turned "on", and the results show the superior performance of the	جامعة فاروس	
	4	<u>A new adaptive</u> <u>beamforming of</u> <u>multiband fractal</u> <u>antenna array in</u> <u>strong-jamming</u> <u>environment</u>	Modern Signal processing Techniques	proposed method. This paper proposes, for the first time, a new radiation pattern synthesis for fractal antenna array that combines the unique multi-band characteristics of fractal arrays with the adaptive beamforming requirements in wireless environment with high- jamming power. In this work, a new adaptive beamforming method based on discrete	2022	https://link.springer.com/article/10.1007/s11277-022-09745-4





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	cbKalman filter is	
	proposed for linear	
	Cantor fractal array with	
	high performance and	
	low computational	
	requirements. The	
	proposed Kalman filter-	
	based beamformer is	
	compared with the Least	
	Mean Squares (LMS) and	
	the Recursive Least	
	Squares (RLS) techniques	
	under various parameter	
	regimes, and the results	
	reveal the superior	
	performance of the	
	proposed approach in	
	terms of beamforming	
	stability, Half-Power	
	Beam Width (HPBW),	
	maximum Side-Lobe	
	Level (SLL), null depth at	
	the direction of	
	interference signals, and	
	convergence rate for	
	different Signal to	
	Interference (SIR) values.	
	Also, the results	
	demonstrate that the	
	suggested approach not	
	only achieves perfect	
	adaptation of the	
ة الْوَنْيَقَة: استخدام داخلي Page <b>6 of 11</b> Rev. (1 ) Date <b>(13-9-2018)</b> Document Security Level	مستوی سریـ Doc. No. ( <b>PUA-IT-P01-F07</b> ) نموذج Issue no.(1) Date <b>(13-9-2018)</b>	





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			radiation pattern synthesis at high jamming power, but also keep the same SLL at different operating frequencies. This shows the usefulness of the proposed approach in multi-band smart antenna technology for mobile communications and other wireless systems.						
5	Synthesis of Wideband <u>Thinned</u> Eisenstein Fractile Antenna Arrays with Adaptive Beamforming Capability and Reduced Side- Lobes	Modern Signal processing Techniques	A modern design of fractal antenna arrays, called fractile array, which exhibits a fractal boundary contour within a tiled plane, is explored for enhanced array performance. In this paper, the Eisenstein fractile array is introduced to exploit the unique geometrical features of fractiles that allow multiband and wideband operation and avoid grating lobes in the radiation pattern even, in some cases, when the array elements' spacing	2022	https://ieeexplore.ieee.org/abstract/document/9954365				
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	is greater than the half	,						
	is greater than the half							
	wavelength. To alleviate							
	the large number of							
	Cide Lake Level (CLL)							
	occurred at large scales,							
	(CA) entimization							
	(GA) Optimization							
	for thinning the							
	proposed antenna array							
	by estimating the							
	"off" elements							
	off elements							
	minimum SLL without							
	degrading the directivity							
	of the radiation pattern							
	Also, the proposed array							
	configuration is designed							
	with adaptivo							
	boomforming conshility							
	using the Least Mean							
	Square (IMS) technique							
	The effectiveness of the							
	proposed GA-LMS							
	approach is investigated							
	by performing several							
	MATLAB simulations							
	under various set of							
	array configurations							
	Results reveal that the							
ـة الوثيقة: استخدام داخلي ۲age 8 of 11 Rev. (1 ) Date <b>(13-9-2018)</b> Document Security Level	مستوی سرپ نموذجC-V Template = Internal Use	Doc. No. ( <b>PUA-IT-P01-F07</b> ) Issue no.(1) Date <b>(13-9-2018)</b>						
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			suggested thinned Eisenstein fractile antenna array using GA- LMS approach is superior in terms of multiband and wideband performance, array element reduction, SLL reduction, grating lobe elimination, and beamforming capability. This elucidates the robustness of the suggested thinned Eisenstein fractile array as a promising design for	جامعة فاروس					
			as a promising design for multiband, wideband, compact, inexpensive, and adaptive smart antennas in modern wireless systems.						
6	New Wideband Antenna Arrays with Low Sidelobe Based on Space Filling Curves	Smart Antenna Arrays	This paper introduces a new design of wideband planar antenna arrays based on space-filling curves with low Side- Lobe Level (SLL). The unique geometrical features of such arrays are exploited to provide wideband operation and to avoid grating lobes in	2023	https://ieeexplore.ieee.org/abstract/document/10066930				
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		the radiation pattern						
		even when the minimum						
		spacing between						
		elements is increased to						
		one-wavelength. Three						
		antenna array						
		configurations based on						
		space-filling curve,						
		namely heighway						
		dragon, twindragon and						
		$Z_2$ heighway dragon						
		arrays, are investigated						
		and compared for						
		various set of parameter						
		regimes. Results reveal						
		that the introduced array						
		designs offer several						
		highly desirable radiation						
		pattern advantages over						
		their conventional						
		periodic planar array						
		counterparts, including						
		wideband operation, SLL						
		reduction, and grating						
		lobe elimination. This						
		demonstrates the						
		importance of the						
		introduced array						
		configuration as a						
		promising design in						
		modern wireless						
	10 - 611	systems.			]			
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