

Adhoc; source: Richard J Hughes: Volume Diffusers for Architectural Acoustics
For partial fulfilment of the Degree of Doctor of Philosophy, at University of Salford :

			Unit
Speed of sound	c	344	m/s
Frequency	F		Hz
Wavelength	λ		m
Cutoff frequency in Hz for the slatwidth:			$c / (2 \times \text{root}(2) \times \text{slat width})$, approximately
Chosen possible total width:		1800 mm	70,9 inch

	Chosen N	Layer	pcs/layer	Width, mm	Total layer width	Layer openess	Width compared to previous inner layer
▲	6	1	2	300	600	67%	1
▼	Cut off frequency:			405 Hz			
	Specular reflection:			1147 hz			
▲	10	2	3	180	540	70%	60,0%
▼	Cut off frequency:			676 Hz			
	Specular reflection:			1911 hz			
▲	17	3	3	106	318	82%	58,8%
▼	Cut off frequency:			1149 Hz			
	Specular reflection:			3249 hz			
▲	29	4	4	62	248	86%	58,6%
▼	Cut off frequency:			1959 Hz			
	Specular reflection:			5542 hz			
▲	50	5	5	36	180	90%	58,0%
▼	Cut off frequency:			3378 Hz			
	Specular reflection:			9556 hz			
Total slat width, all layers, mm:				1886			

An example of the above is shown in Figure 4.39 for an $M = 5$ layered structure (from back to front) are based on Golomb ruler sequences of length $N = \{6, 10, 17, 29, 50\}$. The array has been designed to scatter efficiently from a lower frequency with the individual scattered power cut-off frequencies for each of the layers approximately given as 400Hz, 680Hz, 1.15kHz, 1.96kHz and 3.38kHz respectively. From the sparse array from Section 4.3.3 the array comprises a set of Golomb ruler elements have been selectively removed in order to achieve an approximate 50% openess through the array. The structure has an overall depth from front to back of 0.5m.

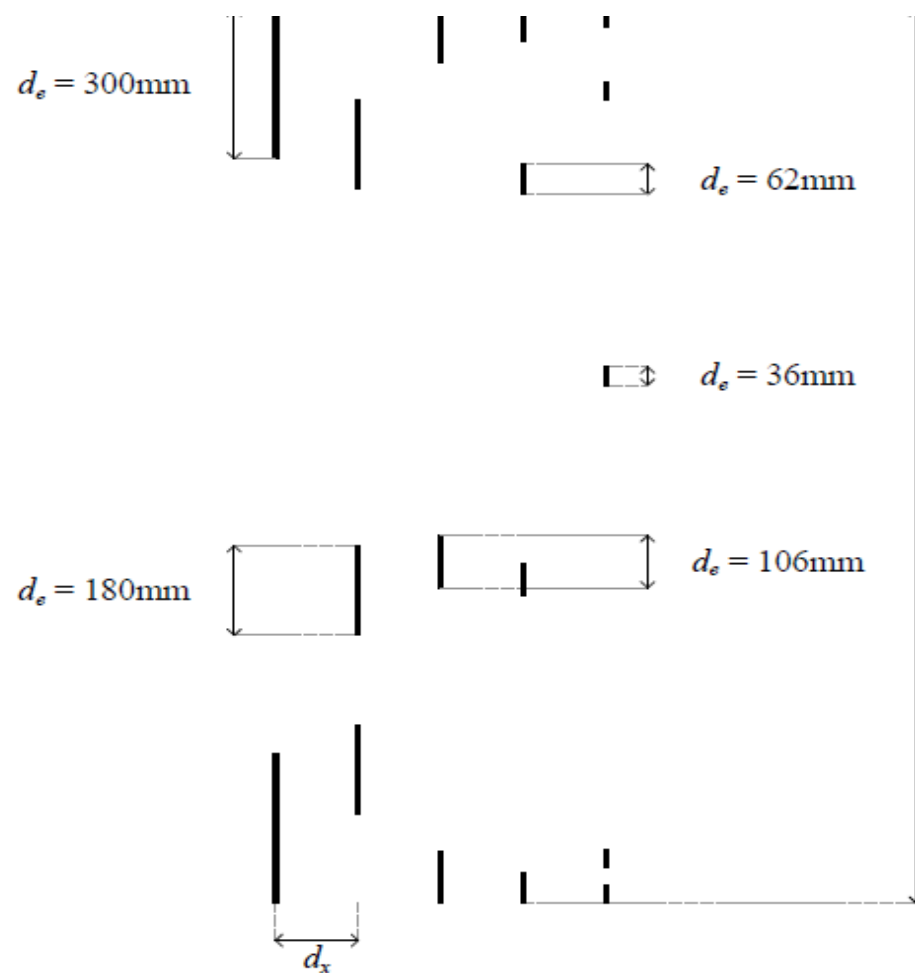


Figure 4.39: $M = 5$ layered Golomb ruler slat array arrangement based on matching approach (varying slat size with layer)

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Original from Richard J Hughes thesis, page 163 below

N	Layer	pcs/layer	Width, mm	Total layer width
6	1	2	300	600
Cut off frequency:			405 Hz	
10	2	3	180	540
Cut off frequency:			676 Hz	
17	3	3	106	318
Cut off frequency:			1149 Hz	
29	4	4	62	248
Cut off frequency:			1959 Hz	
50	5	5	36	180
Cut off frequency:			3378 Hz	

random arrays of slats

are, where layers
6, 10, 17, 29, 50}.

of $f_{min} = 400\text{Hz}$,
the layers being
actively. As with
layers where some
50% line-of-sight
m.

$$D = 1800\text{mm}$$

an impedance
