

# On the Construction of Harmonic Templates ©1992 by Eric Wilson

generator

<u>12/53</u>	<u>1</u>	<u>3</u>	<u>5</u>	<u>7</u>	<u>9</u>	<u>11</u>	<u>13</u>	<u>15</u>	
<u>scale position</u>	0	31	17	43	9	24	37	48	$12 \times, \text{mod } 53$
<u>chain position</u>	0	7	50	8	14	2	34	4	$1 \times, \text{mod } 53$
	(-53)	(-46)	(-3)	(-45)	(-39)	(-51)	(-19)	-49	(-53)
	$\frac{(0 \times 53) + 0}{12} =$								
	12								
	$\frac{(1 \times 53) + 31}{12} =$	7							
		(-46)							
	$\frac{(11 \times 53) + 17}{12} =$	50							
		(-3)							
	$\frac{(1 \times 53) + 43}{12} =$	8							
		(-45)							
	$\frac{(0 \times 53) + 24}{12} =$	2							
		(-51)							
	$\frac{(3 \times 53) + 9}{12} =$	14							
		(-39)							

Generator (see also 5/22)  
7/31

generator

55/94

## generator

31 / 53

generator

19/72

1	3	5	7	9	11	13	15	$19x \pmod{72}$
0	42	23	58	12	33	50	65	
0	6	5	22	12	51	14	11	$1x \pmod{72}$
(-72)	(-66)	(-67)	(-50)	(-60)	(-21)	(-58)	(-61)	-72

Diagram showing the Chinese Remainder Theorem solution for  $x \pmod{72}$ . The remainders 42, 23, 58, 12, 33, 50, 65, and 1 are grouped into pairs under 19, 1, and -72 respectively. Arrows point from each group to a bracketed sum:  $(2 \times 72) + 65$ ,  $(3 \times 72) + 50$ , and  $(13 \times 72) + 12$ . These sums are then grouped under 19.

## Generator

14 / 53

$14/53$	1	3	5	7	9	11	13	15	
A B	C O	31	17	43	9	24	37	48	$14 \times, \text{ mod } 53$
	0	<del>6</del>	5	22	12	32	14	11	
	(-53)	(-47)	(-48)	(-31)	(-41)	(-21)	(-39)	-43	
	$\frac{(0 \times 53) + 0}{14}$	$\frac{(1 \times 53) + 31}{14}$	$\frac{(1 \times 53) + 17}{14}$	$\frac{(5 \times 53) + 43}{14}$	$\frac{(2 \times 53) + 48}{14}$	$\frac{(3 \times 53) + 37}{14}$	$\frac{(8 \times 53) + 24}{14}$	$\frac{(3 \times 53) + 12}{14}$	

# Generator

$\frac{9}{34}$	$\frac{1}{0}$	$\frac{3}{6}$	$\frac{5}{5}$	$\frac{7}{22}$	$\frac{9}{12}$	$\frac{11}{32}$	$\frac{13}{14}$	$\frac{15}{11}$	$9x \bmod 34$
	$\frac{0}{0}$	$\frac{20}{6}$	$\frac{11}{5}$	$\frac{28}{22}$	$\frac{6}{12}$	$\frac{16}{32}$	$\frac{24}{14}$	$\frac{31}{11}$	$1x \bmod 4$
	$(-34)$	$(-28)$	$(-29)$	$(-12)$	$(-22)$	$(-2)$	$(-20)$	$(-23)$	$-34$
$(0 \times 34) + 0$	$\frac{9}{9}$	$\frac{1 \times 34) + 20}{9}$	$\frac{1 \times 34) + 11}{9}$	$\frac{5 \times 34) + 28}{9}$				$\frac{(2 \times 34) + 31}{9}$	$\frac{(3 \times 34) + 24}{9}$
	$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$	$\uparrow$
									$\frac{(8 \times 34) + 16}{9}$
									$\frac{(3 \times 34) + 6}{9}$

## Generator

$5/19$	1	3	5	7	9	11	13	15	$5 \times, \text{mod } 19$
	0	11	6	15	3	9	13	17	
	0	6	5	3	12	17	14	11	$1 \times, \text{mod } 19$
	(-19)	(-13)	(-14)	(-16)	(-7)	(-2)	(-5)	(-8)	-19
$\frac{(0 \times 19) + 0}{5}$									$\frac{(2 \times 19) + 17}{5}$
$\frac{(1 \times 19) + 11}{5}$									$\frac{(3 \times 19) + 13}{5}$
$\frac{(1 \times 19) + 5}{5}$									$\frac{(4 \times 19) + 9}{5}$
$\frac{(0 \times 19) + 15}{5}$									$\frac{(3 \times 19) + 3}{5}$

Generator

4/15

	1	3	5	7	9	11	13	15
0	0	9	5	12	3	7	11	14
0	6	5	3	12	13	14	11	
(0 \times 15) + 0	(-15)	(-9)	(-10)	(-12)	(-3)	(-2)	(-1)	(-4)
4								
(1 \times 15) + 9								
4								
(1 \times 15) + 5								
4								
(0 \times 15) + 12								
4								

chain  
Generator

5/22

	0	3	5	7	9	11	13	15	17
scale site	0	13	7	18	4	10	16	20	2
chain site	0	7	19	8	14	2	12	4	18
(0 \times 22) + 0	(-22)	(-15)	(-3)	(-14)	(-8)	(-20)	(-10)	(-18)	(-4)
5									
(1 \times 22) + 13									
5									
(4 \times 22) + 7									
5									
(1 \times 22) + 18									
5									
(3 \times 22) + 4									
5									