# $S_{10}(2) \pmod 7$

| | blocks | defect | matrix |
|---|---|---|---|
| $G:$ | 1 | 1 | $7 \times 6$ |
| | 2 | 1 | $7 \times 6$ |
| | 3 | 1 | $7 \times 6$ |
| | 4 | 1 | $7 \times 6$ |
| | 5 | 1 | $7 \times 6$ |
| | 6 | 1 | $7 \times 6$ |
| | 7 | 0 | $11935_1 = \chi_{10}, \varphi_{10}$ |
| | 8 | 1 | $7 \times 6$ |
| | 9 | 0 | $18445_1 = \chi_{13}, \varphi_{13}$ |
| | 10 | 1 | $7 \times 6$ |
| | 11 | 0 | $29512_1 = \chi_{15}, \varphi_{15}$ |
| | 12 | 1 | $7 \times 6$ |
| | 13 | 0 | $40579_1 = \chi_{17}, \varphi_{18}$ |
| | 14 | 1 | $7 \times 6$ |
| | 15 | 0 | $52360_1 = \chi_{22}, \varphi_{22}$ |
| | 16 | 0 | $57288_1 = \chi_{23}, \varphi_{23}$ |
| | 17 | 1 | $7 \times 6$ |
| | 18 | 0 | $81158_1 = \chi_{26}, \varphi_{26}$ |
| | 19 | 0 | $184450_1 = \chi_{28}, \varphi_{28}$ |
| | 20 | 0 | $190960_1 = \chi_{29}, \varphi_{29}$ |
| | 21 | 0 | $202895_1 = \chi_{30}, \varphi_{30}$ |
| | 22 | 0 | $202895_2 = \chi_{31}, \varphi_{31}$ |
| | 23 | 0 | $202895_3 = \chi_{32}, \varphi_{32}$ |
| | 24 | 0 | $202895_4 = \chi_{33}, \varphi_{33}$ |
| | 25 | 0 | $365211_1 = \chi_{38}, \varphi_{38}$ |
| | 26 | 0 | $381920_1 = \chi_{40}, \varphi_{40}$ |
| | 27 | 0 | $405790_1 = \chi_{41}, \varphi_{42}$ |
| | 28 | 0 | $405790_2 = \chi_{42}, \varphi_{43}$ |
| | 29 | 0 | $405790_3 = \chi_{43}, \varphi_{44}$ |
| | 30 | 0 | $405790_4 = \chi_{44}, \varphi_{45}$ |
| | 31 | 0 | $405790_5 = \chi_{45}, \varphi_{46}$ |
| | 32 | 0 | $515592_1 = \chi_{48}, \varphi_{48}$ |
| | 33 | 0 | $649264_1 = \chi_{50}, \varphi_{50}$ |
| | 34 | 0 | $811580_1 = \chi_{54}, \varphi_{54}$ |
| | 35 | 0 | $944384_1 = \chi_{56}, \varphi_{56}$ |
| | 36 | 0 | $973896_1 = \chi_{57}, \varphi_{57}$ |
| | 37 | 0 | $973896_2 = \chi_{58}, \varphi_{58}$ |
| | 38 | 0 | $1014475_1 = \chi_{59}, \varphi_{60}$ |
| | 39 | 0 | $1014475_2 = \chi_{60}, \varphi_{61}$ |
| | 40 | 0 | $1014475_3 = \chi_{61}, \varphi_{62}$ |

| | blocks | defect | matrix |
|---|---|---|---|
| | 41 | 0 | $1095633_1 = \chi_{62}, \varphi_{63}$ |
| | 42 | 0 | $1095633_2 = \chi_{63}, \varphi_{64}$ |
| | 43 | 0 | $1217370_1 = \chi_{65}, \varphi_{66}$ |
| | 44 | 0 | $1298528_1 = \chi_{67}, \varphi_{67}$ |
| | 45 | 0 | $1298528_2 = \chi_{68}, \varphi_{68}$ |
| | 46 | 0 | $1432200_1 = \chi_{70}, \varphi_{72}$ |
| | 47 | 0 | $1623160_1 = \chi_{73}, \varphi_{75}$ |
| | 48 | 0 | $1623160_2 = \chi_{74}, \varphi_{76}$ |
| | 49 | 0 | $1623160_3 = \chi_{75}, \varphi_{77}$ |
| | 50 | 0 | $1675520_1 = \chi_{76}, \varphi_{78}$ |
| | 51 | 0 | $1826055_1 = \chi_{77}, \varphi_{79}$ |
| | 52 | 0 | $1826055_2 = \chi_{78}, \varphi_{80}$ |
| | 53 | 0 | $1826055_3 = \chi_{79}, \varphi_{81}$ |
| | 54 | 0 | $1826055_4 = \chi_{80}, \varphi_{82}$ |
| | 55 | 0 | $1826055_5 = \chi_{81}, \varphi_{83}$ |
| | 56 | 0 | $1947792_1 = \chi_{84}, \varphi_{85}$ |
| | 57 | 0 | $2028950_1 = \chi_{86}, \varphi_{86}$ |
| | 58 | 0 | $2028950_2 = \chi_{87}, \varphi_{87}$ |
| | 59 | 0 | $2028950_3 = \chi_{88}, \varphi_{88}$ |
| | 60 | 0 | $2213400_1 = \chi_{89}, \varphi_{89}$ |
| | 61 | 0 | $2434740_1 = \chi_{92}, \varphi_{91}$ |
| | 62 | 0 | $2434740_2 = \chi_{93}, \varphi_{92}$ |
| | 63 | 0 | $2921688_1 = \chi_{95}, \varphi_{96}$ |
| | 64 | 0 | $3055360_1 = \chi_{96}, \varphi_{97}$ |
| | 65 | 0 | $3246320_1 = \chi_{98}, \varphi_{99}$ |
| | 66 | 0 | $3246320_2 = \chi_{99}, \varphi_{100}$ |
| | 67 | 0 | $3246320_3 = \chi_{100}, \varphi_{101}$ |
| | 68 | 0 | $3286899_1 = \chi_{101}, \varphi_{102}$ |
| | 69 | 0 | $3286899_2 = \chi_{102}, \varphi_{103}$ |
| | 70 | 0 | $3652110_1 = \chi_{105}, \varphi_{104}$ |
| | 71 | 0 | $3652110_2 = \chi_{106}, \varphi_{105}$ |
| | 72 | 0 | $4057900_1 = \chi_{107}, \varphi_{107}$ |
| | 73 | 0 | $4382532_1 = \chi_{108}, \varphi_{110}$ |
| | 74 | 0 | $4869480_1 = \chi_{111}, \varphi_{112}$ |
| | 75 | 0 | $4869480_2 = \chi_{112}, \varphi_{113}$ |
| | 76 | 0 | $4869480_3 = \chi_{113}, \varphi_{114}$ |
| | 77 | 0 | $5478165_1 = \chi_{116}, \varphi_{117}$ |
| | 78 | 0 | $5478165_2 = \chi_{117}, \varphi_{118}$ |
| | 79 | 0 | $5478165_3 = \chi_{118}, \varphi_{119}$ |
| | 80 | 0 | $5902400_1 = \chi_{119}, \varphi_{123}$ |

| | blocks | defect | matrix |
|---|---|---|---|
| | 81 | 0 | $6492640_1 = \chi_{126}, \varphi_{126}$ |
| | 82 | 0 | $6492640_2 = \chi_{127}, \varphi_{127}$ |
| | 83 | 0 | $6573798_1 = \chi_{128}, \varphi_{128}$ |
| | 84 | 0 | $7332864_1 = \chi_{130}, \varphi_{129}$ |
| | 85 | 0 | $8115800_1 = \chi_{131}, \varphi_{131}$ |
| | 86 | 0 | $8115800_2 = \chi_{132}, \varphi_{132}$ |
| | 87 | 0 | $8115800_3 = \chi_{133}, \varphi_{133}$ |
| | 88 | 0 | $8115800_4 = \chi_{134}, \varphi_{134}$ |
| | 89 | 0 | $8765064_1 = \chi_{136}, \varphi_{135}$ |
| | 90 | 0 | $9130275_1 = \chi_{137}, \varphi_{137}$ |
| | 91 | 0 | $9130275_2 = \chi_{138}, \varphi_{138}$ |
| | 92 | 0 | $9130275_3 = \chi_{139}, \varphi_{139}$ |
| | 93 | 0 | $9130275_4 = \chi_{140}, \varphi_{140}$ |
| | 94 | 0 | $9738960_1 = \chi_{141}, \varphi_{141}$ |
| | 95 | 0 | $9738960_2 = \chi_{142}, \varphi_{142}$ |
| | 96 | 0 | $9860697_1 = \chi_{143}, \varphi_{143}$ |
| | 97 | 0 | $10388224_1 = \chi_{144}, \varphi_{145}$ |
| | 98 | 0 | $10956330_1 = \chi_{145}, \varphi_{147}$ |
| | 99 | 0 | $10956330_2 = \chi_{146}, \varphi_{148}$ |
| | 100 | 0 | $12985280_1 = \chi_{154}, \varphi_{150}$ |
| | 101 | 0 | $13147596_1 = \chi_{155}, \varphi_{151}$ |
| | 102 | 0 | $13147596_2 = \chi_{156}, \varphi_{152}$ |
| | 103 | 0 | $14501025_1 = \chi_{157}, \varphi_{153}$ |
| | 104 | 0 | $14501025_2 = \chi_{158}, \varphi_{154}$ |
| | 105 | 0 | $14501025_3 = \chi_{159}, \varphi_{155}$ |
| | 106 | 0 | $14501025_4 = \chi_{160}, \varphi_{156}$ |
| | 107 | 0 | $14608440_1 = \chi_{161}, \varphi_{157}$ |
| | 108 | 0 | $14608440_2 = \chi_{162}, \varphi_{158}$ |
| | 109 | 0 | $14608440_3 = \chi_{163}, \varphi_{159}$ |
| | 110 | 0 | $16231600_1 = \chi_{166}, \varphi_{162}$ |
| | 111 | 0 | $16434495_1 = \chi_{167}, \varphi_{163}$ |
| | 112 | 0 | $16434495_2 = \chi_{168}, \varphi_{164}$ |
| | 113 | 0 | $16434495_3 = \chi_{169}, \varphi_{165}$ |
| | 114 | 0 | $16434495_4 = \chi_{170}, \varphi_{166}$ |
| | 115 | 0 | $17530128_1 = \chi_{172}, \varphi_{167}$ |
| | 116 | 0 | $18260550_1 = \chi_{173}, \varphi_{169}$ |
| | 117 | 0 | $18260550_2 = \chi_{174}, \varphi_{170}$ |
| | 118 | 0 | $18887680_1 = \chi_{175}, \varphi_{171}$ |
| | 119 | 0 | $21912660_1 = \chi_{178}, \varphi_{173}$ |
| | 120 | 0 | $22410675_1 = \chi_{180}, \varphi_{174}$ |

| | blocks | defect | matrix |
|---|---|---|---|
| | 121 | 0 | $22410675_2 = \chi_{181}, \varphi_{175}$ |
| | 122 | 0 | $22410675_3 = \chi_{182}, \varphi_{176}$ |
| | 123 | 0 | $23856525_1 = \chi_{185}, \varphi_{177}$ |
| | 124 | 0 | $23856525_2 = \chi_{186}, \varphi_{178}$ |
| | 125 | 0 | $23856525_3 = \chi_{187}, \varphi_{179}$ |
| | 126 | 0 | $25970560_1 = \chi_{188}, \varphi_{180}$ |
| | 127 | 0 | $25970560_2 = \chi_{189}, \varphi_{181}$ |
| | 128 | 0 | $26295192_1 = \chi_{190}, \varphi_{182}$ |
| | 129 | 0 | $29002050_1 = \chi_{192}, \varphi_{183}$ |
| | 130 | 0 | $29002050_2 = \chi_{193}, \varphi_{184}$ |
| | 131 | 0 | $29216880_1 = \chi_{194}, \varphi_{185}$ |
| | 132 | 0 | $32868990_1 = \chi_{196}, \varphi_{186}$ |

| **Block 1:** | $\varphi_1$ | $\varphi_{20}$ | $\varphi_{36}$ | $\varphi_{51}$ | $\varphi_{59}$ | $\varphi_{69}$ |
|---|---|---|---|---|---|---|
| $1_1 = \chi_1$ | 1 | . | . | . | . | . |
| $46376_1 = \chi_{19}$ | . | 1 | . | . | . | . |
| $278256_1 = \chi_{36}$ | 1 | . | 1 | . | . | . |
| $736560_1 = \chi_{51}$ | . | 1 | . | 1 | . | . |
| $1292544_1 = \chi_{66}$ | . | . | 1 | . | 1 | . |
| $2023680_1 = \chi_{85}$ | . | . | . | 1 | . | 1 |
| $2347785_1 = \chi_{90}$ | . | . | . | . | 1 | 1 |

$$\begin{aligned} \varphi_1 &= 1_1 \\ \varphi_{20} &= 46376_1 \\ \varphi_{36} &= 278255_1 \\ \varphi_{51} &= 690184_1 \\ \varphi_{59} &= 1014289_1 \\ \varphi_{69} &= 1333496_1 \end{aligned}$$

| **Block 2:** | $\varphi_2$ | $\varphi_7$ | $\varphi_{17}$ | $\varphi_{39}$ | $\varphi_{90}$ | $\varphi_{95}$ |
|---|---|---|---|---|---|---|
| $155_1 = \chi_2$ | 1 | . | . | . | . | . |
| $6138_1 = \chi_7$ | 1 | 1 | . | . | . | . |
| $46376_2 = \chi_{20}$ | . | 1 | 1 | . | . | . |
| $371008_1 = \chi_{39}$ | . | . | . | 1 | . | . |
| $2347785_2 = \chi_{91}$ | . | . | 1 | . | 1 | . |
| $3142656_1 = \chi_{97}$ | . | . | . | 1 | . | 1 |
| $5079040_1 = \chi_{115}$ | . | . | . | . | 1 | 1 |

$$\begin{aligned} \varphi_2 &= 155_1 \\ \varphi_7 &= 5983_1 \\ \varphi_{17} &= 40393_1 \\ \varphi_{39} &= 371008_1 \\ \varphi_{90} &= 2307392_1 \\ \varphi_{95} &= 2771648_1 \end{aligned}$$

| **Block 3:** | $\varphi_3$ | $\varphi_{11}$ | $\varphi_{41}$ | $\varphi_{73}$ | $\varphi_{124}$ | $\varphi_{144}$ |
|---|---|---|---|---|---|---|
| $187_1 = \chi_3$ | 1 | . | . | . | . | . |
| $17050_1 = \chi_{11}$ | . | 1 | . | . | . | . |
| $417384_1 = \chi_{46}$ | . | 1 | 1 | . | . | . |
| $1855040_1 = \chi_{82}$ | . | . | 1 | 1 | . | . |
| $5936128_3 = \chi_{122}$ | 1 | . | . | . | 1 | . |
| $11738925_4 = \chi_{151}$ | . | . | . | 1 | . | 1 |
| $16220160_1 = \chi_{165}$ | . | . | . | . | 1 | 1 |

$$\begin{aligned}\varphi_3 &= 187_1\\ \varphi_{11} &= 17050_1\\ \varphi_{41} &= 400334_1\\ \varphi_{73} &= 1454706_1\\ \varphi_{124} &= 5935941_1\\ \varphi_{144} &= 10284219_1\end{aligned}$$

| **Block 4:** | $\varphi_4$ | $\varphi_{27}$ | $\varphi_{37}$ | $\varphi_{108}$ | $\varphi_{109}$ | $\varphi_{130}$ |
|---|---|---|---|---|---|---|
| $341_1 = \chi_4$ | 1 | . | . | . | . | . |
| $173910_1 = \chi_{27}$ | 1 | 1 | . | . | . | . |
| $313038_1 = \chi_{37}$ | . | . | 1 | . | . | . |
| $4452096_1 = \chi_{109}$ | . | 1 | . | 1 | . | . |
| $4637600_1 = \chi_{110}$ | . | . | 1 | . | 1 | . |
| $11738925_3 = \chi_{150}$ | . | . | . | 1 | . | 1 |
| $11784960_1 = \chi_{152}$ | . | . | . | . | 1 | 1 |

$$\begin{aligned}\varphi_4 &= 341_1\\ \varphi_{27} &= 173569_1\\ \varphi_{37} &= 313038_1\\ \varphi_{108} &= 4278527_1\\ \varphi_{109} &= 4324562_1\\ \varphi_{130} &= 7460398_1\end{aligned}$$

| **Block 5:** | $\varphi_5$ | $\varphi_8$ | $\varphi_{35}$ | $\varphi_{98}$ | $\varphi_{120}$ | $\varphi_{125}$ |
|---|---|---|---|---|---|---|
| $495_1 = \chi_5$ | 1 | . | . | . | . | . |
| $11594_1 = \chi_8$ | 1 | 1 | . | . | . | . |
| $231880_2 = \chi_{35}$ | . | . | 1 | . | . | . |
| $3339072_1 = \chi_{103}$ | . | . | 1 | 1 | . | . |
| $6127616_1 = \chi_{123}$ | . | 1 | . | . | . | 1 |
| $8729600_1 = \chi_{135}$ | . | . | . | 1 | 1 | . |
| $11738925_1 = \chi_{148}$ | . | . | . | . | 1 | 1 |

$$\begin{aligned}\varphi_5 &= 495_1\\ \varphi_8 &= 11099_1\\ \varphi_{35} &= 231880_1\\ \varphi_{98} &= 3107192_1\\ \varphi_{120} &= 5622408_1\\ \varphi_{125} &= 6116517_1\end{aligned}$$

| **Block 6:** | $\varphi_6$ | $\varphi_9$ | $\varphi_{34}$ | $\varphi_{84}$ | $\varphi_{121}$ | $\varphi_{160}$ |
|---|---|---|---|---|---|---|
| $527_1 = \chi_6$ | 1 | . | . | . | . | . |
| $11594_2 = \chi_9$ | . | 1 | . | . | . | . |
| $231880_1 = \chi_{34}$ | 1 | . | 1 | . | . | . |
| $1855040_2 = \chi_{83}$ | . | 1 | . | 1 | . | . |
| $5936128_2 = \chi_{121}$ | . | . | 1 | . | 1 | . |
| $17268736_1 = \chi_{171}$ | . | . | . | 1 | . | 1 |
| $21130065_1 = \chi_{176}$ | . | . | . | . | 1 | 1 |

$$\begin{aligned}\varphi_6 &= 527_1\\ \varphi_9 &= 11594_1\\ \varphi_{34} &= 231353_1\\ \varphi_{84} &= 1843446_1\\ \varphi_{121} &= 5704775_1\\ \varphi_{160} &= 15425290_1\end{aligned}$$

| **Block 8:** | $\varphi_{12}$ | $\varphi_{19}$ | $\varphi_{65}$ | $\varphi_{94}$ | $\varphi_{106}$ | $\varphi_{172}$ |
|---|---|---|---|---|---|---|
| $17391_1 = \chi_{12}$ | 1 | . | . | . | . | . |
| $46035_1 = \chi_{18}$ | . | 1 | . | . | . | . |
| $1159400_1 = \chi_{64}$ | . | 1 | 1 | . | . | . |
| $2782560_1 = \chi_{94}$ | 1 | . | . | 1 | . | . |
| $5008608_1 = \chi_{114}$ | . | . | 1 | . | 1 | . |
| $22347776_1 = \chi_{179}$ | . | . | . | 1 | . | 1 |
| $23477850_2 = \chi_{184}$ | . | . | . | . | 1 | 1 |

$\varphi_{12} = 17391_1$
$\varphi_{19} = 46035_1$
$\varphi_{65} = 1113365_1$
$\varphi_{94} = 2765169_1$
$\varphi_{106} = 3895243_1$
$\varphi_{172} = 19582607_1$

| **Block 10:** | $\varphi_{14}$ | $\varphi_{47}$ | $\varphi_{52}$ | $\varphi_{93}$ | $\varphi_{122}$ | $\varphi_{136}$ |
|---|---|---|---|---|---|---|
| $28985_1 = \chi_{14}$ | 1 | . | . | . | . | . |
| $434775_1 = \chi_{47}$ | . | 1 | . | . | . | . |
| $782595_1 = \chi_{52}$ | 1 | . | 1 | . | . | . |
| $3478200_1 = \chi_{104}$ | . | . | 1 | 1 | . | . |
| $6260760_1 = \chi_{124}$ | . | 1 | . | . | 1 | . |
| $11738925_2 = \chi_{149}$ | . | . | . | 1 | . | 1 |
| $14840320_1 = \chi_{164}$ | . | . | . | . | 1 | 1 |

$\varphi_{14} = 28985_1$
$\varphi_{47} = 434775_1$
$\varphi_{52} = 753610_1$
$\varphi_{93} = 2724590_1$
$\varphi_{122} = 5825985_1$
$\varphi_{136} = 9014335_1$

| **Block 12:** | $\varphi_{16}$ | $\varphi_{25}$ | $\varphi_{49}$ | $\varphi_{71}$ | $\varphi_{111}$ | $\varphi_{187}$ |
|---|---|---|---|---|---|---|
| $40392_1 = \chi_{16}$ | 1 | . | . | . | . | . |
| $63240_1 = \chi_{25}$ | . | 1 | . | . | . | . |
| $556512_1 = \chi_{49}$ | 1 | . | 1 | . | . | . |
| $1473120_1 = \chi_{71}$ | . | 1 | . | 1 | . | . |
| $5936128_1 = \chi_{120}$ | . | . | . | 1 | 1 | . |
| $33554432_1 = \chi_{197}$ | . | . | 1 | . | . | 1 |
| $37564560_1 = \chi_{198}$ | . | . | . | . | 1 | 1 |

$\varphi_{16} = 40392_1$
$\varphi_{25} = 63240_1$
$\varphi_{49} = 516120_1$
$\varphi_{71} = 1409880_1$
$\varphi_{111} = 4526248_1$
$\varphi_{187} = 33038312_1$

| **Block 14:** | $\varphi_{21}$ | $\varphi_{53}$ | $\varphi_{70}$ | $\varphi_{115}$ | $\varphi_{146}$ | $\varphi_{161}$ |
|---|---|---|---|---|---|---|
| $52173_1 = \chi_{21}$ | 1 | . | . | . | . | . |
| $782595_2 = \chi_{53}$ | . | 1 | . | . | . | . |
| $1408671_1 = \chi_{69}$ | 1 | . | 1 | . | . | . |
| $6260760_2 = \chi_{125}$ | . | . | 1 | 1 | . | . |
| $11269368_1 = \chi_{147}$ | . | 1 | . | . | 1 | . |
| $21130065_2 = \chi_{177}$ | . | . | . | 1 | . | 1 |
| $26712576_1 = \chi_{191}$ | . | . | . | . | 1 | 1 |

$\varphi_{21} = 52173_1$
$\varphi_{53} = 782595_1$
$\varphi_{70} = 1356498_1$
$\varphi_{115} = 4904262_1$
$\varphi_{146} = 10486773_1$
$\varphi_{161} = 16225803_1$

| **Block 17:** | $\varphi_{24}$ | $\varphi_{55}$ | $\varphi_{74}$ | $\varphi_{116}$ | $\varphi_{149}$ | $\varphi_{168}$ |
|---|---|---|---|---|---|---|
| $57970_1 = \chi_{24}$ | 1 | . | . | . | . | . |
| $869550_1 = \chi_{55}$ | . | 1 | . | . | . | . |
| $1565190_1 = \chi_{72}$ | 1 | . | 1 | . | . | . |
| $6956400_1 = \chi_{129}$ | . | . | 1 | 1 | . | . |
| $12521520_1 = \chi_{153}$ | . | 1 | . | . | 1 | . |
| $23477850_1 = \chi_{183}$ | . | . | . | 1 | . | 1 |
| $29680640_1 = \chi_{195}$ | . | . | . | . | 1 | 1 |

$$\begin{aligned}
\varphi_{24} &= 57970_1 \\
\varphi_{55} &= 869550_1 \\
\varphi_{74} &= 1507220_1 \\
\varphi_{116} &= 5449180_1 \\
\varphi_{149} &= 11651970_1 \\
\varphi_{168} &= 18028670_1
\end{aligned}$$