气动参数包括轴向力系数、法向力系数、俯仰力矩系数、斜吹力矩系数、阻尼力矩系数等，参见下表所示。进行插值时，使用MATLAB的interp函数进行插值（interp1一维插值，interp2二维插值，interp3进行三维插值），插值方法为线性插值linear，注意不要外插。

a）轴向力系数

1. 轴向力系数Ca

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| -10 | 0.4618 | 0.5054 | 0.75330 | 0.48211 | 0.33656 | 0.31571 |
| -6 | 0.4789 | 0.5183 | 0.76917 | 0.48015 | 0.32426 | 0.30237 |
| -2 | 0.4952 | 0.5314 | 0.79039 | 0.45726 | 0.31366 | 0.28465 |
| 0 | 0.4993 | 0.5343 | 0.79823 | 0.45538 | 0.30948 | 0.28144 |
| 2 | 0.4952 | 0.5314 | 0.79039 | 0.45726 | 0.31366 | 0.28465 |
| 6 | 0.4789 | 0.5183 | 0.76917 | 0.48015 | 0.32426 | 0.30237 |
| 10 | 0.4618 | 0.5054 | 0.75330 | 0.48211 | 0.33656 | 0.31571 |

b）法向力系数

1. （由攻角产生的法向力系数）

| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| --- | --- | --- | --- | --- | --- | --- |
| -10 | -3.9298 | -4.1567 | -4.6937 | -2.5745 | -1.7810 | -1.5451 |
| -6 | -2.3032 | -2.5939 | -2.6970 | -1.4957 | -1.0036 | -0.8701 |
| -2 | -0.6803 | -0.7550 | -0.7759 | -0.4573 | -0.2872 | -0.2559 |
| 2 | 0.6812 | 0.7501 | 0.7668 | 0.4579 | 0.2992 | 0.2235 |
| 6 | 2.2015 | 2.4744 | 2.6372 | 1.4818 | 1.0138 | 0.8082 |
| 10 | 3.7647 | 4.1317 | 4.6860 | 2.6550 | 1.9558 | 1.5828 |

1. （由舵偏角产生的法向力系数）

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| -10 | -0.2892 | -0.2716 | -0.2742 | -0.1622 | -0.0748 | -0.1193 |
| -6 | -0.1923 | -0.1344 | -0.1748 | -0.1514 | -0.0807 | -0.0869 |
| -2 | -0.1881 | -0.155 | -0.1266 | -0.0910 | -0.0850 | -0.0741 |
| 0 | -0.1977 | -0.1581 | -0.1375 | -0.1060 | -0.0894 | -0.0775 |
| 2 | -0.271 | -0.2618 | -0.1497 | -0.1209 | -0.0938 | -0.0800 |
| 6 | -0.3552 | -0.3594 | -0.2739 | -0.1679 | -0.0961 | -0.0833 |
| 10 | -0.3293 | -0.3035 | -0.3243 | -0.1579 | -0.1176 | -0.1070 |

1. （由舵偏角产生的法向力系数）

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| -10 | 0.3293 | 0.3035 | 0.3243 | 0.1579 | 0.1176 | 0.1070 |
| -6 | 0.3552 | 0.3594 | 0.2739 | 0.1679 | 0.0961 | 0.0833 |
| -2 | 0.271 | 0.2618 | 0.1497 | 0.1209 | 0.0938 | 0.0800 |
| 0 | -0.1169 | -0.1169 | -0.0860 | -0.0731 | -0.0399 | -0.0337 |
| 2 | 0.1881 | 0.155 | 0.1266 | 0.0910 | 0.0850 | 0.0741 |
| 6 | 0.1923 | 0.1344 | 0.1748 | 0.1514 | 0.0807 | 0.0869 |
| 10 | 0.2892 | 0.2716 | 0.2742 | 0.1622 | 0.0748 | 0.1193 |

c）俯仰力矩系数

1. （由攻角产生的俯仰力矩系数）

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| -10 | 2.8855 | 3.0797 | 3.4349 | 1.7721 | 1.1081 | 0.9468 |
| -6 | 1.6461 | 1.8753 | 1.9416 | 1.0324 | 0.6248 | 0.5312 |
| -2 | 0.4598 | 0.5116 | 0.5317 | 0.3158 | 0.1796 | 0.1546 |
| 2 | -0.4589 | -0.5140 | -0.5244 | -0.3163 | -0.1871 | -0.1352 |
| 6 | -1.5691 | -1.7939 | -1.9018 | -1.0260 | -0.6325 | -0.4928 |
| 10 | -2.7248 | -3.0250 | -3.4473 | -1.7862 | -1.2176 | -0.9760 |

1. （由舵偏角产生的俯仰力矩系数）

| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| --- | --- | --- | --- | --- | --- | --- |
| -10 | -0.0223 | 0.0203 | 0.0147 | 0.0105 | -0.0209 | 0.0154 |
| -6 | -0.0974 | -0.1373 | -0.1231 | -0.0261 | -0.0048 | 0.0050 |
| -2 | -0.1207 | -0.1695 | -0.1894 | -0.0556 | -0.0014 | 0.0011 |
| 0 | -0.1255 | -0.1575 | -0.2103 | -0.0795 | -0.0031 | 0.0042 |
| 2 | -0.1018 | -0.1564 | -0.2337 | -0.0408 | 0.0055 | 0.0086 |
| 6 | -0.0352 | -0.0761 | -0.1407 | -0.0270 | 0.0086 | 0.0123 |
| 10 | 0.0008 | -0.0077 | -0.0641 | -0.0390 | 0.0185 | 0.0222 |

1. （由舵偏角产生的俯仰力矩系数）

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| -10 | -0.0008 | 0.0077 | 0.0641 | 0.0390 | -0.0185 | -0.0222 |
| -6 | 0.0352 | 0.0761 | 0.1407 | 0.0270 | -0.0086 | -0.0123 |
| -2 | 0.1018 | 0.1564 | 0.2337 | 0.0408 | -0.0055 | -0.0086 |
| 0 | 0.1255 | 0.1575 | 0.2103 | 0.0795 | 0.0031 | -0.0042 |
| 2 | 0.1207 | 0.1695 | 0.1894 | 0.0556 | 0.0014 | -0.0011 |
| 6 | 0.0974 | 0.1373 | 0.1231 | 0.0261 | 0.0048 | -0.0050 |
| 10 | 0.0223 | -0.0203 | -0.0147 | -0.0105 | 0.0209 | -0.0154 |

d）横向力系数

1. （由侧滑角产生的横向力系数）

| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| --- | --- | --- | --- | --- | --- | --- |
| -10 | 3.9298 | 4.1567 | 4.6937 | 2.5745 | 1.7810 | 1.5451 |
| -6 | 2.3032 | 2.5939 | 2.6970 | 1.4957 | 1.0036 | 0.8701 |
| -2 | 0.6803 | 0.7550 | 0.7759 | 0.4573 | 0.2872 | 0.2559 |
| 2 | -0.6812 | -0.7501 | -0.7668 | -0.4579 | -0.2992 | -0.2235 |
| 6 | -2.2015 | -2.4744 | -2.6372 | -1.4818 | -1.0138 | -0.8082 |
| 10 | -3.7647 | -4.1317 | -4.6860 | -2.6550 | -1.9558 | -1.5828 |

1. （δy=-10 °由舵偏角产生的横向力系数）

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| -10 | 0.2892 | 0.2716 | 0.2742 | 0.1622 | 0.0748 | 0.1193 |
| -6 | 0.1923 | 0.1344 | 0.1748 | 0.1514 | 0.0807 | 0.0869 |
| -2 | 0.1881 | 0.155 | 0.1266 | 0.0910 | 0.0850 | 0.0741 |
| 0 | 0.1977 | 0.1581 | 0.1375 | 0.1060 | 0.0894 | 0.0775 |
| 2 | 0.271 | 0.2618 | 0.1497 | 0.1209 | 0.0938 | 0.0800 |
| 6 | 0.3552 | 0.3594 | 0.2739 | 0.1679 | 0.0961 | 0.0833 |
| 10 | 0.3293 | 0.3035 | 0.3243 | 0.1579 | 0.1176 | 0.1070 |

1. （δy=10 °由舵偏角产生的横向力系数）

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| -10 | -0.3293 | -0.3035 | -0.3243 | -0.1579 | -0.1176 | -0.1070 |
| -6 | -0.3552 | -0.3594 | -0.2739 | -0.1679 | -0.0961 | -0.0833 |
| -2 | -0.271 | -0.2618 | -0.1497 | -0.1209 | -0.0938 | -0.0800 |
| 0 | -0.1977 | -0.1581 | -0.1375 | -0.1060 | -0.0894 | -0.0775 |
| 2 | -0.1881 | -0.155 | -0.1266 | -0.0910 | -0.0850 | -0.0741 |
| 6 | -0.1923 | -0.1344 | -0.1748 | -0.1514 | -0.0807 | -0.0869 |
| 10 | -0.2892 | -0.2716 | -0.2742 | -0.1622 | -0.0748 | -0.1193 |

e）偏航力矩系数

1. （由侧滑角产生的偏航力矩系数）

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| -10 | 2.8855 | 3.0797 | 3.4349 | 1.7721 | 1.1081 | 0.9468 |
| -6 | 1.6461 | 1.8753 | 1.9416 | 1.0324 | 0.6248 | 0.5312 |
| -2 | 0.4598 | 0.5116 | 0.5317 | 0.3158 | 0.1796 | 0.1546 |
| 0 | 0.0006 | -0.0033 | -0.0017 | 0.0011 | 0.0003 | 0.0078 |
| 2 | -0.4589 | -0.5140 | -0.5244 | -0.3163 | -0.1871 | -0.1352 |
| 6 | -1.5691 | -1.7939 | -1.9018 | -1.0260 | -0.6325 | -0.4928 |
| 10 | -2.7248 | -3.0250 | -3.4473 | -1.7862 | -1.2176 | -0.9760 |

1. （由舵偏角产生的偏航力矩系数）

| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| --- | --- | --- | --- | --- | --- | --- |
| -10 | -0.0223 | 0.0203 | 0.0147 | 0.0105 | -0.0209 | 0.0154 |
| -6 | -0.0974 | -0.1373 | -0.1231 | -0.0261 | -0.0048 | 0.0050 |
| -2 | -0.1207 | -0.1695 | -0.1894 | -0.0556 | -0.0014 | 0.0011 |
| 0 | -0.1255 | -0.1575 | -0.2103 | -0.0795 | -0.0031 | 0.0042 |
| 2 | -0.1018 | -0.1564 | -0.2337 | -0.0408 | 0.0055 | 0.0086 |
| 6 | -0.0352 | -0.0761 | -0.1407 | -0.0270 | 0.0086 | 0.0123 |
| 10 | 0.0008 | -0.0077 | -0.0641 | -0.0390 | 0.0185 | 0.0222 |

1. （由舵偏角产生的偏航力矩系数）

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| /Ma | 0.5 | 0.8 | 1.2 | 2.5 | 5 | 7 |
| -10 | -0.0008 | 0.0077 | 0.0641 | 0.0390 | -0.0185 | -0.0222 |
| -6 | 0.0352 | 0.0761 | 0.1407 | 0.0270 | -0.0086 | -0.0123 |
| -2 | 0.1018 | 0.1564 | 0.2337 | 0.0408 | -0.0055 | -0.0086 |
| 0 | 0.1255 | 0.1575 | 0.2103 | 0.0795 | 0.0031 | -0.0042 |
| 2 | 0.1207 | 0.1695 | 0.1894 | 0.0556 | 0.0014 | -0.0011 |
| 6 | 0.0974 | 0.1373 | 0.1231 | 0.0261 | 0.0048 | -0.0050 |
| 10 | 0.0223 | -0.0203 | -0.0147 | -0.0105 | 0.0209 | -0.0154 |

f）滚转气动参数（由于计算误差，按ty-3g气动报告试验值给的超音速舵效）

1. 滚转力矩系数

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| /Ma | 0.5 | 0.8 | 1.2 | 1.5 | 2.5 | 3.5 | 5 | 7 |
| -10 | -0.0006 | 0.0011 | -0.0057 | -0.0041 | -0.0011 | -0.0002 | -0.0005 | -0.0007 |
| -8 | -0.0005 | 0.0005 | -0.0041 | -0.0029 | -0.0007 | -0.0002 | -0.0002 | -0.0004 |
| -6 | -0.0006 | 0.0000 | -0.0025 | -0.0010 | -0.0003 | -0.0002 | -0.0001 | -0.0001 |
| -4 | -0.0004 | -0.0008 | -0.0009 | -0.0006 | -0.0001 | -0.0002 | 0.0000 | -0.0001 |
| -2 | -0.0004 | -0.0006 | -0.0001 | -0.0006 | -0.0002 | -0.0001 | 0.0000 | -0.0001 |
| 0 | 0.0004 | 0.0000 | -0.0001 | -0.0006 | -0.0002 | -0.0001 | 0.0000 | -0.0001 |
| 2 | -0.0001 | 0.0005 | -0.0001 | -0.0006 | -0.0002 | -0.0001 | 0.0000 | -0.0001 |
| 4 | -0.0003 | -0.0004 | -0.0009 | -0.0006 | -0.0001 | -0.0002 | 0.0000 | -0.0001 |
| 6 | -0.0004 | -0.0007 | -0.0025 | -0.0010 | -0.0003 | -0.0002 | -0.0001 | -0.0001 |
| 8 | 0.0000 | -0.0002 | -0.0041 | -0.0029 | -0.0007 | -0.0002 | -0.0002 | -0.0004 |
| 10 | -0.0007 | -0.0003 | -0.0057 | -0.0041 | -0.0011 | -0.0002 | -0.0005 | -0.0007 |

1. 滚转力矩系数

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| /Ma | 0.5 | 0.8 | 1.2 | 1.5 | 2.5 | 3.5 | 5 | 7 |
| -10 | 0.0029 | 0.0025 | -0.0005 | -0.0006 | -0.0009 | -0.0012 | -0.0011 | -0.0008 |
| -8 | 0.0022 | 0.0019 | -0.0008 | -0.0008 | -0.0008 | -0.0009 | -0.0008 | -0.0007 |
| -6 | 0.0015 | 0.0014 | -0.0010 | -0.0010 | -0.0008 | -0.0006 | -0.0006 | -0.0005 |
| -4 | 0.0009 | 0.0009 | -0.0013 | -0.0012 | -0.0007 | -0.0003 | -0.0003 | -0.0004 |
| -2 | 0.0001 | 0.0001 | -0.0006 | -0.0005 | -0.0003 | -0.0001 | -0.0002 | -0.0003 |
| 0 | 0.0002 | 0.0001 | -0.0003 | -0.0003 | -0.0002 | -0.0001 | -0.0002 | -0.0003 |
| 2 | 0.0001 | 0.0001 | -0.0006 | -0.0005 | -0.0003 | -0.0001 | -0.0002 | -0.0003 |
| 4 | 0.0008 | 0.0006 | -0.0013 | -0.0012 | -0.0007 | -0.0002 | -0.0003 | -0.0003 |
| 6 | 0.0014 | 0.0011 | -0.0010 | -0.0010 | -0.0008 | -0.0006 | -0.0005 | -0.0005 |
| 8 | 0.0020 | 0.0014 | -0.0008 | -0.0008 | -0.0009 | -0.0011 | -0.0008 | -0.0007 |
| 10 | 0.0022 | 0.0017 | -0.0005 | -0.0006 | -0.0010 | -0.0015 | -0.0010 | -0.0008 |

g）阻尼力矩系数

1. 俯仰阻尼力矩系数

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ma | 0.5 | 0.8 | 1.2 | 1.5 | 2.5 | 3.5 | 5 | 7 |
|  | -1.4474 | -1.5887 | -2.6024 | -2.4284 | -1.8920 | -1.2934 | -1.0936 | -0.8059 |

1. 偏航阻尼力矩系数

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ma | 0.5 | 0.8 | 1.2 | 1.5 | 2.5 | 3.5 | 5 | 7 |
|  | -1.4474 | -1.5887 | -2.6024 | -2.4284 | -1.8920 | -1.2934 | -1.0936 | -0.8059 |

1. 滚转阻尼力矩系数

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Ma | 0.5 | 0.8 | 1.2 | 1.5 | 2.5 | 3.5 | 5 | 7 |
| 滚转  阻尼 | -0.0177 | -0.0200 | -0.0360 | -0.03356 | -0.0256 | -0.01755 | -0.01514 | -0.01027 |