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**The next functions provide the solution in double precision of the HKE-SDG code by using the Modified Newton-Rhapson method (authors: V. Raposo Pulido and J. Pelaez)**

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**<hyperk.h> :** header file where the different modules and functions of the code are declared

**<polinomios25.c>** and **<polinomios25Q.c> :** polynomials for the seed

**<keplerh.c> :** set of functions to estimate the polynomial and asymptotic approximations for the seed as well as the numerical method to estimate the final value of the hyperbolic anomaly

**<main.c> :** this module contains a driver to check the code. Is an example about how the function must be run. In this function the eccentricity and mean anomaly are defined

**Note:** the next table provides important values for the polynomial approach ---$p_i(x)$ --- (columns 1-5) and for the polynomial approach ---$q_j(x)$---- (columns 6-10). In real calculations the ends on these intervals are determined with more significant figures

| Intervals defined in the solution - $p_i(x)$ | | | | | Intervals defined in the solution - $q_j(x)$ | | | | |
|---|---|---|---|---|---|---|---|---|---|
| $i$ | $S_i$ | $S_{i+1}$ | $x_i$ | $x_{i+1}$ | $j$ | $S_j$ | $S_{j+1}$ | $x_j$ | $x_{j+1}$ |
| 1 | 0 | 0.201 | 0 | $-0.200+0.201e$ | 1 | 0.100 | 0.305 | $0.100e-0.100$ | $0.305e-0.300$ |
| 2 | 0.201 | 0.411 | $-0.200+0.201e$ | $-0.400+0.411e$ | 2 | 0.305 | 0.521 | $0.305e-0.300$ | $0.521e-0.500$ |
| 3 | 0.411 | 0.637 | $-0.400+0.411e$ | $-0.600+0.637e$ | 3 | 0.521 | 0.759 | $0.521e-0.500$ | $0.759e-0.700$ |
| 4 | 0.637 | 0.888 | $-0.600+0.637e$ | $-0.800+0.888e$ | 4 | 0.759 | 1.027 | $0.759e-0.700$ | $1.027e-0.900$ |
| 5 | 0.888 | 1.175 | $-0.800+0.888e$ | $-1.000+1.175e$ | 5 | 1.027 | 1.336 | $1.027e-0.900$ | $1.336e-1.100$ |
| 6 | 1.175 | 1.509 | $-1.000+1.175e$ | $-1.200+1.509e$ | 6 | 1.336 | 1.698 | $1.336e-1.100$ | $1.698e-1.300$ |
| 7 | 1.509 | 1.904 | $-1.200+1.509e$ | $-1.400+1.904e$ | 7 | 1.698 | 2.129 | $1.698e-1.300$ | $2.129e-1.500$ |
| 8 | 1.904 | 2.376 | $-1.400+1.904e$ | $-1.600+2.376e$ | 8 | 2.129 | 2.646 | $2.129e-1.500$ | $2.646e-1.700$ |
| 9 | 2.376 | 2.942 | $-1.600+2.376e$ | $-1.800+2.942e$ | 9 | 2.646 | 3.268 | $2.646e-1.700$ | $3.268e-1.900$ |
| 10 | 2.942 | 3.627 | $-1.800+2.942e$ | $-2.000+3.627e$ | 10 | 3.268 | 4.022 | $3.268e-1.900$ | $4.022e-2.100$ |
| 11 | 3.627 | 4.457 | $-2.000+3.627e$ | $-2.200+4.457e$ | 11 | 4.022 | 4.937 | $4.022e-2.100$ | $4.937e-2.300$ |
| 12 | 4.457 | 5.467 | $-2.200+4.457e$ | $-2.400+5.467e$ | 12 | 4.937 | 6.050 | $4.937e-2.300$ | $6.050e-2.500$ |
| 13 | 5.467 | 6.695 | $-2.400+5.467e$ | $-2.600+6.695e$ | 13 | 6.050 | 7.406 | $6.050e-2.500$ | $7.406e-2.700$ |
| 14 | 6.695 | 8.192 | $-2.600+6.695e$ | $-2.800+8.192e$ | 14 | 7.406 | 9.060 | $7.406e-2.700$ | $9.060e-2.900$ |
| 15 | 8.192 | 10.018 | $-2.800+8.192e$ | $-3.000+10.018e$ | 15 | 9.060 | 11.077 | $9.060e-2.900$ | $11.076e-3.100$ |
| 16 | 10.018 | 12.246 | $-3.000+10.018e$ | $-3.200+12.246e$ | 16 | 11.077 | 13.538 | $11.076e-3.100$ | $13.538e-3.300$ |
| 17 | 12.246 | 14.965 | $-3.200+12.246e$ | $-3.400+14.965e$ | 17 | 13.538 | 16.543 | $13.538e-3.300$ | $16.543e-3.500$ |
| 18 | 14.965 | 18.285 | $-3.400+14.965e$ | $-3.600+18.285e$ | 18 | 16.543 | 20.211 | $16.543e-3.500$ | $20.211e-3.700$ |
| 19 | 18.285 | 22.339 | $-3.600+18.285e$ | $-3.800+22.339e$ | 19 | 20.211 | 24.691 | $20.211e-3.700$ | $24.691e-3.900$ |
| 20 | 22.339 | 27.290 | $-3.800+22.339e$ | $-4.000+27.290e$ | 20 | 24.691 | 30.162 | $24.691e-3.900$ | $30.162e-4.100$ |
| 21 | 27.290 | 33.336 | $-4.000+27.290e$ | $-4.200+33.336e$ | 21 | 30.162 | 36.843 | $30.162e-4.100$ | $36.843e-4.300$ |
| 22 | 33.336 | 40.719 | $-4.200+33.336e$ | $-4.400+40.719e$ | 22 | 36.843 | 45.003 | $36.843e-4.300$ | $45.003e-4.500$ |
| 23 | 40.719 | 49.737 | $-4.400+40.719e$ | $-4.600+49.737e$ | 23 | 45.003 | 54.969 | $45.003e-4.500$ | $54.969e-4.700$ |
| 24 | 49.737 | 60.751 | $-4.600+49.737e$ | $-4.800+60.751e$ | 24 | 54.969 | 67.141 | $54.969e-4.700$ | $67.141e-4.900$ |
| 25 | 60.751 | 74.203 | $-4.800+60.751e$ | $-5.00+74.203e$ | | | | | |
| 26 | 74.203 | $\infty$ | $-5.00+74.203e$ | $\infty$ | | | | | |