

Comparison of contour plots using C-code and Mathematica

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The contour plots for the functions $S_1 = 0$ and $S_2 = 0$ and $S_4 = 0$ were generated using C-code and Mathematica. The C-code was run in a hierarchical mode (CPU time of 2.877 seconds) where, the search space was reduced for subsequent functions as well as in the normal mode (CPU time of 3.843 seconds), where all the functions were evaluated for the whole workspace. The resulting plots are shown in the figure-1a and figure-1b. The figure-1a shown is for the normal mode. The minimum radii found in both the cases match.

It has to be noted that the condition corresponding to the δmax , which is the joint limit for the spherical joint, did not produce any contour in the search space.

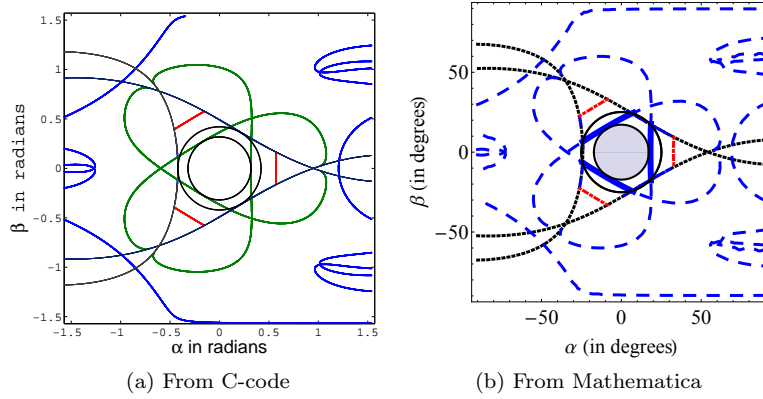


Figure 1: Contour plots at $z = 135$ mm

The minimum radii at 5 different heave positions were found and are tabulated in table 2. The Mathematica code took 54 seconds of CPU time to run for all the functions while the C-code was much faster at about 2.877 s for the complete data evaluation. All the evaluations were done on the Dell machine.

Table 1: Minimum radii for different z

z (mm)	C-code (degrees)	Mathematica (degrees)	Error (%)
90	4.0923	4.1108	0.44
107	15.7197	15.7394	0.13
124	17.3243	17.3100	0.08
141	18.8695	18.8552	0.08
158	11.4469	11.4617	0.13

Table 2: Computational Effort Comparison

Parameter	C-code	Mathematica
CPU Time (s)	13.085	107.484
Real Time (s)	2.877	-
Processors used	8	Default
Maximum Recursion	4	Default
Plot Points	100 x 100	Default
ϵ on Function Value	10^{-6}	Default