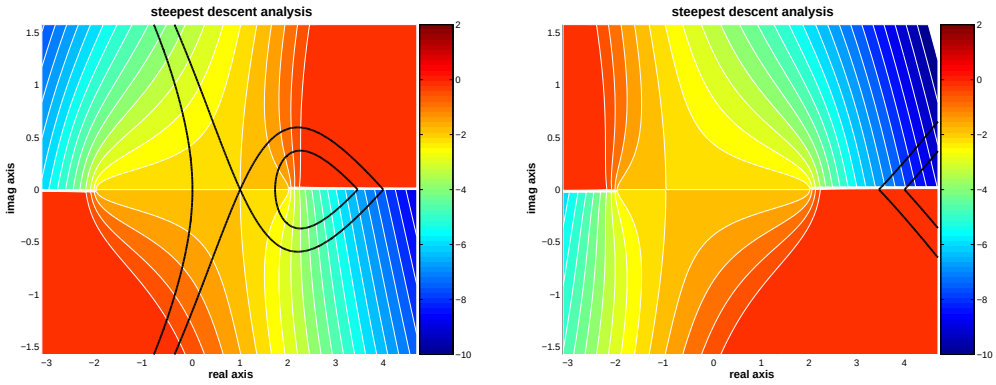
Investigations #04 • APMA 935 • Elasticity

- Final write-up due, by Noon Friday 03 March. Please submit a progress report to webct by Monday 27 February.

A) Radiation II (6 pages) Push the analysis of Problem #3.8 (Billingham/King, page 73) further.

(i) Before embarking on the approximation step, numerically compute a few far-field ($z \gg a$) radiation profiles ($|\phi(r,z)|^2$, for fixed z) to develop an understanding for the radiation pattern. Note that the integrand has an integrable singularity. Devise a strategy for intelligently dealing with this issue. Include parameter choices from both of the suggested limits involving $a\omega/c$.

(ii) The approximation step in the text seems to suggest replacing the Bessel function $J_0(\cdot)$ by an integral representation. Consider the far-field limit as a fixed value of $z \gg a$ with $r = z \tan\alpha$. Interchanging the order of integration would seem to lead to a steepest descent approximation for large z. I believe that the remaining integral over the angle θ can be addressed using stationary phase.



B) Torsional Waves (6 pages) Problem #5.5 (Billingham/King, page 171). I do not know for sure what the second part will reveal – although I have my guesses.