Review for “An Optimized GPU Implementation of the MVDR Beamformer for Active Sonar Imaging” by Jo Inge Buskenes, Jon Petter Asen, Carl-Inge Colombo Nilsen, Andreas Austeng

1. General – Mpx/s is not a widely known abbreviation. This needs to be defined upon first use.
2. General - “Matlab” should be all caps: “MATLAB” throughout the paper.
3. Abstract – A key attribute of the MVDR studied in this paper is the use of a subarray approximation. This should be stated up front in the abstract, i.e. “subarray MVDR” instead of MVDR.
4. Abstract – This paper advertises an impressive (“more than two orders of magnitude) improvement over a C implementation of MVDR, but this is really misleading. In reality, an improvement of up to an order of magnitude is achieved over an optimized C implementation, as later stated in the caption for figure 8. A comparison of an optimized GPU implementation to an unoptimized C implementation is not very meaningful – both should be optimized. The abstract should be revised to indicate up to an order of magnitude over an optimized C implementation.
5. Section I (page 2) – typo in second paragraph: “litterature” should be “literature”.
6. Section I (page 2) – subarray processing is a common approximation and should be included in this list (reference D J Chapman, “Partial Adaptivity for the Large Array,” IEEE Trans. Antennas & Prop., Vol. Ap-24, No. 5, September 1976, pp. 685-696).
7. Section II (page 4) – should reference the literature (from above comment 6) on the subarray approximation in paragraph 3.
8. Section IIIA (page 11) – typo in first paragraph after figure: “got” should be “get”.
9. Section IIIB (page 12) – remove “a” in “It is a Gauss Jordan based”.
10. Section IIIC (page 12) - “which are a mere scaled version” should be “which are merely scaled versions”
11. Section IV (page 14, figure 8) – the sub-plots on the top break the processing out into 3 pieces, yet the lower sub-plots reflect the entire processing string for MATLAB and C. It would be useful to show the entire processing time for the GPU for better comparison. Perhaps breaking the two rows of sub-plots into two figures would work better.
12. Section IV (page 14) – comment about real processing improvement over optimized C should be related in the text instead of a caption. This is an important point about the comparisons made in the paper.
13. Section IV (page 15, caption of figure 10) - “cruel” should be “crude”
14. Section IV (page 16) – the point made in the first paragraph about the data transfer from GPU to CPU being ignored further muddies the water in comparing the two approaches. This point should also be stated up front. I would suggest making a very clear itemization of the assumptions and caveats about the two approaches.
15. Section V (page 17) – the reason the C implementation is linear in L is because it is dominated by the calculation of the covariance matrix and data movement. The inversion is negligible here. On the other hand, the GPU optimizes the covariance calculation so much that now the inversion is significant, hence the non-linear computation time as a function of L. This is really the key point to be made in the comparison between the two approaches, in my opinion.
16. Section V (page 17) – bottom of page, “hold- ups” has an extra space after the hyphen.
17. Section VI (page 18) – two spaces before “1 Mpx/s” in 4th paragraph.