approach. Its performance is validated and evaluated over simulated data. Promising results are reported. Future work will be focused on the comparison of the proposed Box PF with other algorithms such as the PHD filter and also evaluation using real data.

Acknowledgements. The authors acknowledges the support of the [European Community's] Seventh Framework Programme [FP7/2007-2013] under grant agreement No 238710 (Monte Carlo based Innovative Management and Processing for an Unrivalled Leap in Sensor Exploitation).

REFERENCES

- D. Angelova and L. Mihaylova, "Extended object tracking using Monte Carlo methods," *IEEE Transactions on Signal Processing*, vol. 56, no. 2, pp. 825–832, 2008.
- [2] —, "Extended object tracking using mixture Kalman filtering," in Numerical Methods and Applications. Lecture Notes in Computer Science. T. Boyanov et al. (Eds.), May 2007, pp. 122–130. [Online]. Available: http://www.springerlink.com/content/lj3074n372807754
- [3] M. Feldmann, D. Franken, and W. Koch, "Tracking of extended objects and group targets using random matrices," *IEEE Transactions on Signal Processing*, vol. 59, no. 4, pp. 1409 –1420, april 2011.
- [4] M. Baum, M. Feldmann, D. Fraenken, U. D. Hanebeck, and W. Koch, "Extended object and group tracking: A comparison of random matrices and random hypersurface models," in *GI Jahrestagung* (2), 2010, pp. 904–906.
- [5] M. Baum, M. Feldmann, D. Frnken, U. D. Hanebeck, and W. Koch, "Extended object and group tracking: A comparison of random matrices and random hypersurface models," in *LNCS*, 2010.
- [6] W. Koch and M. Feldmann, "Cluster tracking under kinematical constraints using random matrices," *Robotics and Autonomous Systems*, vol. 57, no. 3, pp. 296 – 309, 2009.
- [7] M. Feldmann and D. Franken, "Tracking of extended objects and group targets using random matrices - a new approach," in *Proc. of the 2008 11th International Conf. on Information Fusion*, 2008, pp. 1–8.
- [8] W. Koch and R. Saul, "A Bayesian approach to extended object tracking and tracking of loosely structured target groups," in *Proc. of the 8th International Conf. on Inform. Fusion.* ISIF, 2005.
- [9] Y. Boers, H. Driesen, J. Torstensson, M. Trieb, R. Karlsson, and F. Gustafsson, "Track-before-detect algorithm for tracking extended targets," *IEE Proceedings on Radar, Sonar and Navigation*, vol. 153, no. 4, pp. 345 – 351, 2006.
- [10] O. Drummmond, S. Blackman, and G. Petrisor, "Tracking clusters and extended objects with multiple sensors," in *Proc. of SPIE, Vol. 1305, Signal and Data Processing of Small Targets 1990*, 1990, pp. 362–375.
- [11] A. Swain and D. Clark, "Extended object filtering using spatial independent cluster processes," in *Proceedings of the 13th Conference on Information Fusion (FUSION)*, july 2010, pp. 1–8.
- [12] D. Salmond and N. Gordon, "Group and extended object tracking," in Proc. IEE Colloquium on Target Tracking: Algorithms and Applications, 1999, pp. 16/1 – 16/4.
- [13] K. Gilholm and D. Salmond, "Spatial distribution model for tracking extended objects," *IEE Proc.-Radar, Sonar Navig.*, vol. 152, no. 5, pp. 364–371, 2005.
- [14] K. Gilholm, S. Godsill, S. Maskell, and D. Salmond, "Poisson models for extended target and group tracking," in *Proceedings of SPIE 5913*, 2005.
- [15] J. Vermaak, N. Ikoma, and S. Godsill, "Sequential Monte Carlo framework for extended object tracking," *IEE Proc.-Radar, Sonar Navig.*, vol. 152, no. 5, pp. 353–363, 2005.
- [16] K. Granström, C. Lundquist, and U. Orguner, "A Gaussian mixture PHD filter for extended target tracking," in *Proceedings of International Conference on Information Fusion*, Edinburgh, Scotland, May 2010.
- [17] M. Baum and U. Hanebeck, "Shape tracking of extended objects and group targets with star-convex RHMs," in *Proceedings of the International Conference on Information Fusion*, 2011.
- [18] M. Baum and U. D. Hanebeck, "Extended object tracking based on combined set-theoretic and stochastic fusion," in *Proc. of the International Conf. on Information Fusion*, 2009.

- [19] M. Baum and U. Hanebeck, "Random hypersurface models for extended object tracking," in *Proc. of the IEEE International Symp. on Signal Processing and Information Technology (ISSPIT)*, 2009, pp. 178–183.
- [20] F. Abdallah, A. Gning, and P. Bonnifait, "Box particle filtering for nonlinear state estimation using interval analysis," *Automatica*, vol. 44, no. 3, pp. 807–815, 2008.
- [21] A. Gning, L. Mihaylova, and F. Abdallah, "Mixture of uniform probability density functions for nonlinear state estimation using interval analysis," in *Proc. of 13th International Conference on Information Fusion*. ISIF, Edinburgh, UK, 2010.
- [22] A. Gning, L. Mihaylova, F. Abdallah, and B. Ristic, "Particle filtering combined with interval methods for tracking applications," in *Integrated Tracking, Classification, and Sensor Management: Theory and Applications*, M. Mallick, V. Krishnamurthy, and B.-N. Vo, Eds. John Wiley & Sons, 2012.
- [23] A. Gning, B. Ristic, and L. Mihaylova, "Bernouli/ box-particle filters for detection and tracking in the presence of triple measurement uncertainty," *IEEE Transactions on Signal Processing*, vol. 60, no. 5, pp. 2138 – 2151, 2012.
- [24] N. Petrov, L. Mihaylova, A. Gning, and D. Angelova, "A novel sequential Monte Carlo approach for extended object tracking based on border parameterisation," in *Proceedings of the 14th International Conference* on Information Fusion, Chicago, USA, 2011, pp. 306–313.
- [25] B. Ristic, "Bayesian estimation with imprecise likelihoods: Random set approach," *Signal Processing Letters, IEEE*, vol. 18, no. 7, pp. 395–398, july 2011.
- [26] L. Jaulin, M. Kieffer, O. Didrit, and E. Walter, *Applied Interval Analysis*. Springer-Verlag, 2001.
- [27] X. R. Li and V. Jilkov, "A survey of maneuveuvering target tracking. Part I: Dynamic models," *IEEE Trans. on Aerosp. and Electr. Systems*, vol. 39, no. 4, pp. 1333–1364, 2003.
- [28] Y. Bar-Shalom and X. Li, Estimation and Tracking: Principles, Techniques and Software. Artech House, 1993.
- [29] A. Gning, B. Ristic, L. Mihaylova, and F. Abdallah, "Introduction to box particle filtering," *IEEE Signal Processing Magazine*, 2012, in press.