

# **A Fully Automated Sea Boundary Delineator**

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## **ABSTRACT**

Although the problem addressed in this paper may arise on land, it is typically found in a maritime context, when one is trying to determine the limits of the Territorial Sea, Extended Zone and Economic Exclusion Zone, as well as the so-called Median and Equidistant Lines. To delineate on a map the boundaries of those zones, that is, to trace a line that lies at a constant distance from another line or set of lines, is a problem that in pre-computer times was solved with a ruler, a compass, a calculator, and perhaps a procedure for computing the intersections of lines on the ellipsoid. As with most geometric applications, this process changed with the arrival of the computer. Since then the technical literature has recorded experiences with partially automated solutions that parallel the manual method. As with their manual predecessors, computer applications can be characterized by their point-to-point mode as well as for the interactive selection and sorting of the resulting intersections. Some of those solutions, herewith designated as PTP (Point-To-Point) for the sake of brevity, have been turned into commercial offerings while others are strictly in-house products. Using a variety of PTP solutions, government agencies have argued cases of boundary conflicts between sovereign states or between internal jurisdictions of a country. This paper offers another solution to the delineation problem, with the key distinction of being a fully automated procedure. Furthermore, because the entire input line contributes simultaneously to the solution, the proposed solution is more of a global solution as opposed to a point-to-point. Its main component is waterlining, a device used in the past to denote water in maps. A second major component, a Medial-Axis Transformation, must be used in the delineation of the Median and Equidistant Lines. The advantages of full automation are discussed vis-à-vis the interactive mode of the currently used PTP solutions. Lastly, remarks are made with regard to the principle of Straight Baselines, its *raison d'être*, and its superfluousness should a global method of delineation be available.

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