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**On cubic spline approximations for the vortex patch problem.** (English) Zbl 1013.76066  
*Appl. Numer. Math.* 36, No. 4, 359-387 (2001).

Summary: Based on the contour dynamics equation (CDE), we introduce a numerical method for solving the CDE by means of a global cubic spline interpolation between nodes. This method is shown to be convergent for all time, and is numerically tested against exact solutions for the CDE, the well-known flows of Kirchhoff ellipses. We compare this method with a method obtained by using the building blocks of the method designed by *D. G. Dritschel* [*Comput. Phys. Reports* 10, 17-146 (1989)]. Without the use of any node redistribution technique, we find a better performance of our method in several error estimates such as node position, tangent and curvature. This performance improves as the curvature of the contour increases.

**MSC:**

76M25 Other numerical methods (fluid mechanics) (MSC2010)  
76B47 Vortex flows for incompressible inviscid fluids

Cited in 5 Documents

**Keywords:**

convergence analysis; curvature of contour; vortex patch problem; contour dynamics equation; global cubic spline interpolation; Kirchhoff ellipses

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