

# Description of the test cases

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This ancillary file describes, for reference and for future comparisons, the numerical test cases presented in the paper *Anisotropic Fast Marching on cartesian grids using Lattice Basis Reduction*. These numerical experiments can be reproduced using the joined C++ code.

- The 2-d test case is posed on the domain  $\Omega = [-1.1, 1.1]^2$ , involves three parameters  $\omega_0 = 6\pi$ ,  $r_0 = \delta_0 = 1/100$  (the parameter  $\delta_0$  was slightly larger in the original experiment [1]), and the curve  $\Gamma : [0, 1] \rightarrow \Omega$  defined by  $\Gamma(t) = t(\cos \omega_0 t, \sin \omega_0 t)$ . For all  $z \in \Omega$  we have  $\mathcal{M}(z) = \text{Id}$ , except if there exists  $0 \leq t \leq 1$  and  $0 \leq r \leq r_0$  such that  $z = \Gamma(t) + r(\cos \omega_0 t, \sin \omega_0 t)$ . In that case  $\mathcal{M}(z)$  has the eigenvalues  $\delta_0^2$  and 1, the former being associated to the eigenvector  $\Gamma'(t)$ .
- The 3-d test case is posed on the domain  $\Omega = [-1.1, 1.1]^2 \times [0, 3]$ , involves the three parameters  $\omega_0 = (5/2)\pi$ ,  $r_0 = \delta_0 = 1/50$ , and the curve defined by  $\Gamma(t) = (\cos \omega_0 t, \sin \omega_0 t, t)$ . For all  $z \in \Omega$  we have  $\mathcal{M}(z) = \text{Id}$ , except if there exists  $t, \lambda, \mu \in \mathbb{R}$  such that  $z = \Gamma(t) + (\lambda \cos(\omega_0 t), \lambda \sin \omega_0 t, \mu)$  and  $\lambda^2 + \mu^2 \leq (r_0/2)^2$ . In that case  $\mathcal{M}(z)$  has the eigenvalues  $\delta_0^2$  and 1, the former being associated to the eigenvector  $\Gamma'(t)$  and the latter to the orthogonal space.

## References

- [1] F. Benmansour, L. D. Cohen, *Tubular Structure Segmentation Based on Minimal Path Method and Anisotropic Enhancement*, International Journal of Computer Vision, 92(2), 192-210, 2010.

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