Subdivision Exterior Calculus for Geometry Processing
Supplemental Material: Extended Figures

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This document provides extended versions of Figs. 4, 5 and 6 from the main text, with side-by-side comparisons of DEC, SEC and IGA.

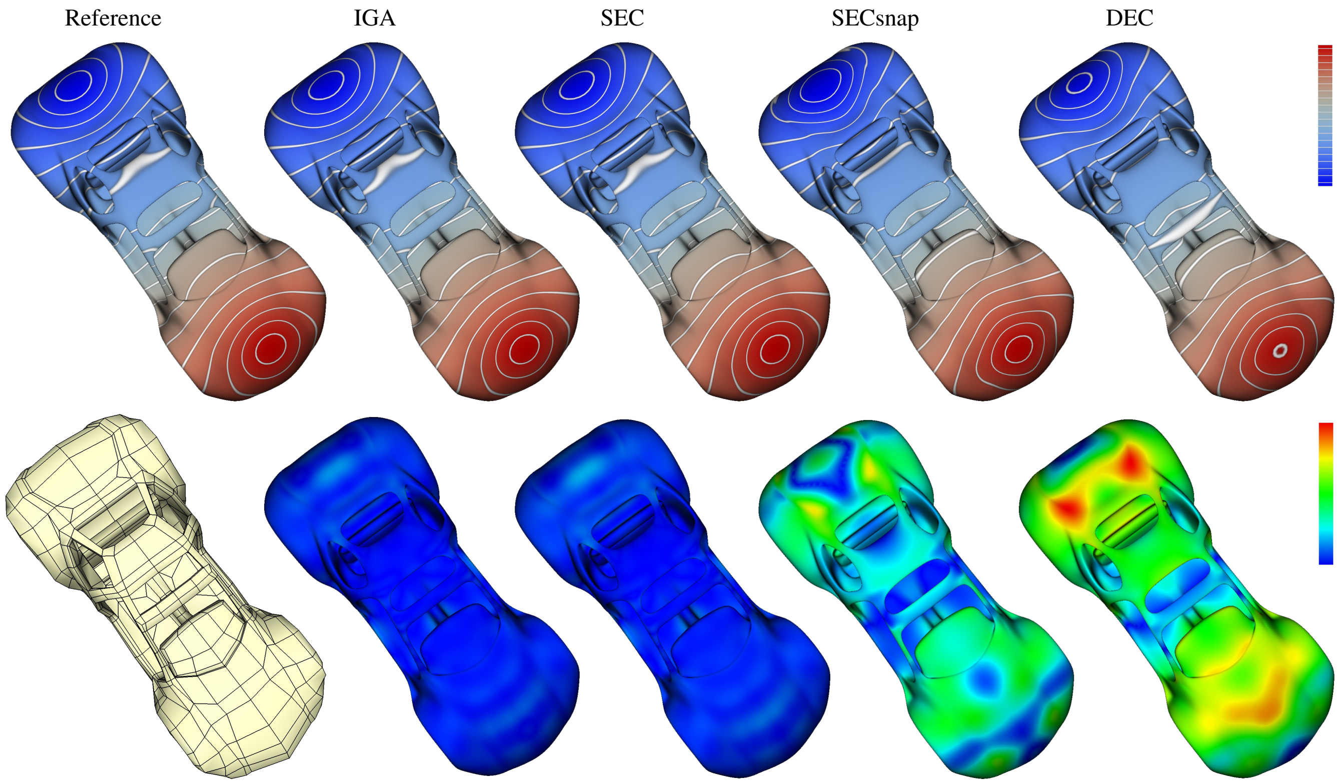

Figure 4: ***Numerical accuracy.*** *Solving a Poisson equation on the control mesh of the car model with IGA, SEC ($l = 3$), SEC ($l = 0$) with snapping, and DEC, respectively, demonstrates the increase in accuracy that SEC and IGA produce, with the numerical solution nearly matching the reference solution computed on a $16K$ times finer mesh. Top row exhibits color-coded values of the solution on the subdivided mesh once scaled to match the range of the reference solution, while bottom row shows the magnitude of the pointwise difference to the reference solution once normalized by the maximum residual among these three methods.*

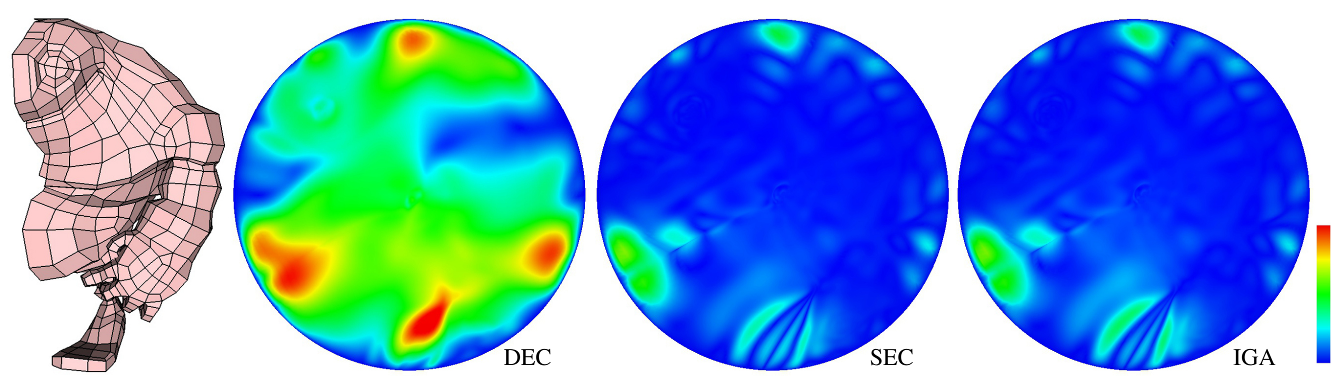

Figure 5: ***Fixed-boundary parameterization.*** *With the boundary of the half big guy model (left) set to a circle, minimizing the conformal energy on the control mesh using DEC (middle-left, color-coded error map) is significantly worse than using SEC (middle-right, $l = 3$) or IGA (right) when compared to a reference solution computed at higher resolution.*

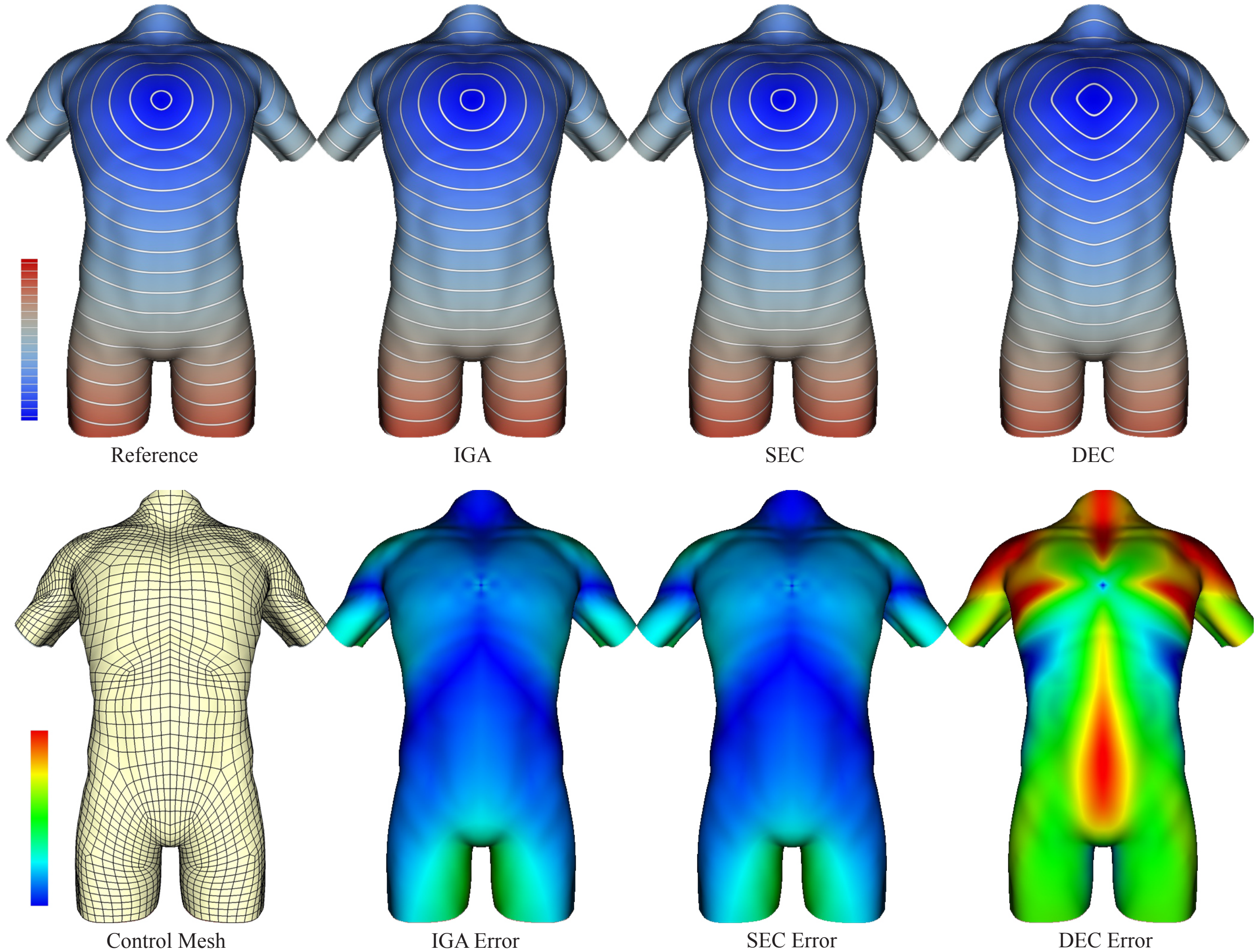

Figure 6: ***Geodesic distances on Torso.*** *Applying the heat method of Crane et al. [2013] using DEC operators on the control mesh of the torso model results in large distance errors on the subdivision surface (right). Our SEC ($l = 3$) operators (middle-right) provide much improved distances compared to the reference solution (left) computed on a 64 times finer mesh. Similarly, an IGA discretization provides improved results (middle left), visually comparable to SEC.*

References

CRANE, K., WEISCHEDEL, C., AND WARDETZKY, M. 2013. Geodesics in heat: A new approach to computing distance based on heat flow. *ACM Trans. Graph. 32*, 5, Art. 152.