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ADAPTATION OF 2D UNSTRUCTURED MESH BASED ON SOLUTION GRADIENTS

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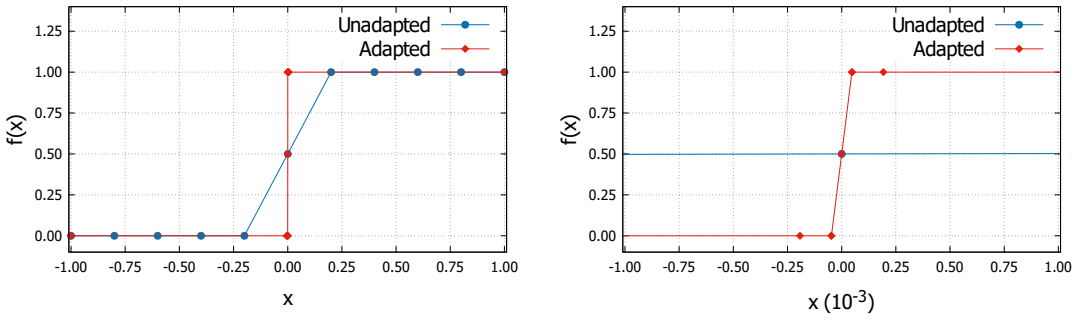
The work presented in this paper attempts to improve the grid (and consequently solution) for simulations on a 2D unstructured Navier-Stokes solver for compressible flows using mesh adaptation based on gradients of flow parameters (pressure and pseudo-entropy) and grid geometry (cell areas, nodal distances etc.). A formula was developed to move nodes based on the adaptive techniques discussed in Eiseman [1] and Jahangirian and Shoraka [2]. The procedure requires solution (primitive variables) reconstruction at nodes, which are interpolated using Lagrangian polynomials or inverse distance based methods, and cell-averaged gradients, which are computed using Green-Gauss method. The adaption is terminated if the global maximum displacement of any node is less than ϵ, where ϵ is a small user defined number. A 1D version of this formula is tested on the the Heaviside function $H(x)$ discretized on the domain $x \in [-1, 1]$ using 11 points. The results obtained are shown in Figure 1. All points clustered about $x = 0$ as expected.



(a) Piecewise linear representations

(b) Zoomed image

Figure 1: 1D adaptation of the Heaviside function

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