GEOMETRY-INDEPENDENT LOW-REYNOLDS-NUMBER REYNOLDS-STRESS MODEL: A MODIFICATION
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The careful near-wall behavior analysis shows that orders of lowest order terms of near-wall expansions for vertical normal and shear stresses are incorrect for developed geometry-independent low-Reynolds-number (LRN) Reynolds-stress models (RSM) and smaller [1] than those of the conventional expansions or can not be find analytically. The modifications of dissipation rate tensor and pressure-containing term approximations of the RSM closures denoted as NWRS [2] and NNWRS/C [3] are proposed to solve this problem in LRN flow computations and based on a new geometry-independent pseudo-wall-normal tensor. Use of this tensor and partial introduction of the modified ‘Yap’ correction term into the dissipation rate equation allowed us to get the correct near-wall behaviors of dissipation tensor components, pressure containing terms and Reynolds stresses themselves at the level of lowest order expansion terms, as well as to improve predictions (Fig. 1) in comparison with NWRS and NNWRS/C.

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References
Fig. 1. Profiles of velocity field characteristics in channel flow at $Re = 395$, values of dissipation terms are normalized by $u^4/v$. 