Gridgen
Reliable CFD Meshing

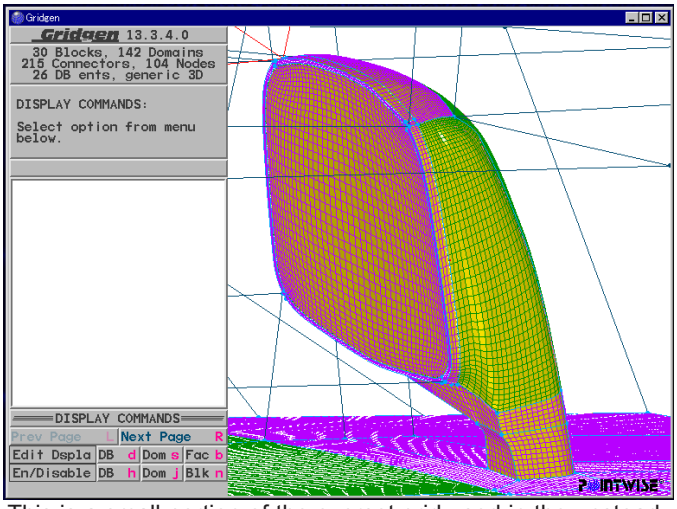
Toyota uses Gridgen for Flow Around Car Body

Wind generated noise and vibration around automobiles is becoming a greater concern as other noise sources are eliminated or muffled. Wind noise is generated by unsteadiness in the flowfield. It is difficult to numerically predict the acoustic field around an automobile because of the computer time and fidelity required to simulate unsteady separated flows accurately.

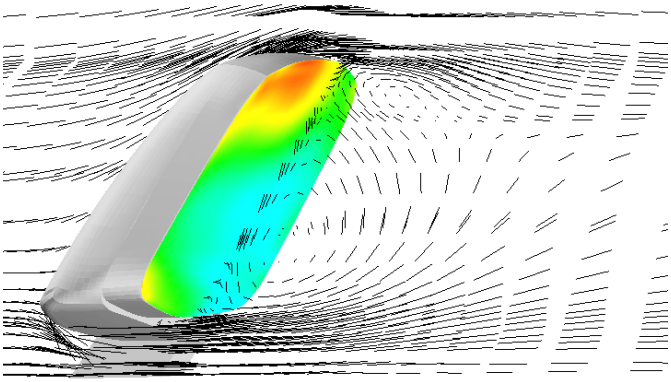
The Applied Mathematics Laboratory of Toyota Central Research and Development Laboratories has been carrying out acoustic analyses of airflow around cars using their proprietary CFD code COSMOS-V. It is a fast and highly accurate solver for unsteady flow field analyses. COSMOS-V uses the overset grid method in which boundary fitted grids generated to partially cover the computational region are overlapped with each other for computations. It incorporates a mathematical scheme that correctly conserves physical quantities with high accuracy even onoverlapping grids. This code has therefore enabled them to obtain highly accurate unsteady flow field simulations that would be difficult, if not impossible, using an off-the-shelf CFD solver.

For their grid generation process, they use advanced features of Gridgen quite extensively in order to generate high quality boundary fitted grids required for their analyses (see top illustration). The bottom figure shows a snapshot of the unsteady flow field around a car door mirror unit.

Toyota Central Research and Development Laboratories is a customer of VINAS Co., Ltd., the Gridgen distributor for Japan.



This is a small portion of the overset grid used in the unsteady CFD analysis.


Velocity vectors show separated flow behind mirror.

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App Sheet—Toyota

Reprinted from the *Focal Point* Spring 2001