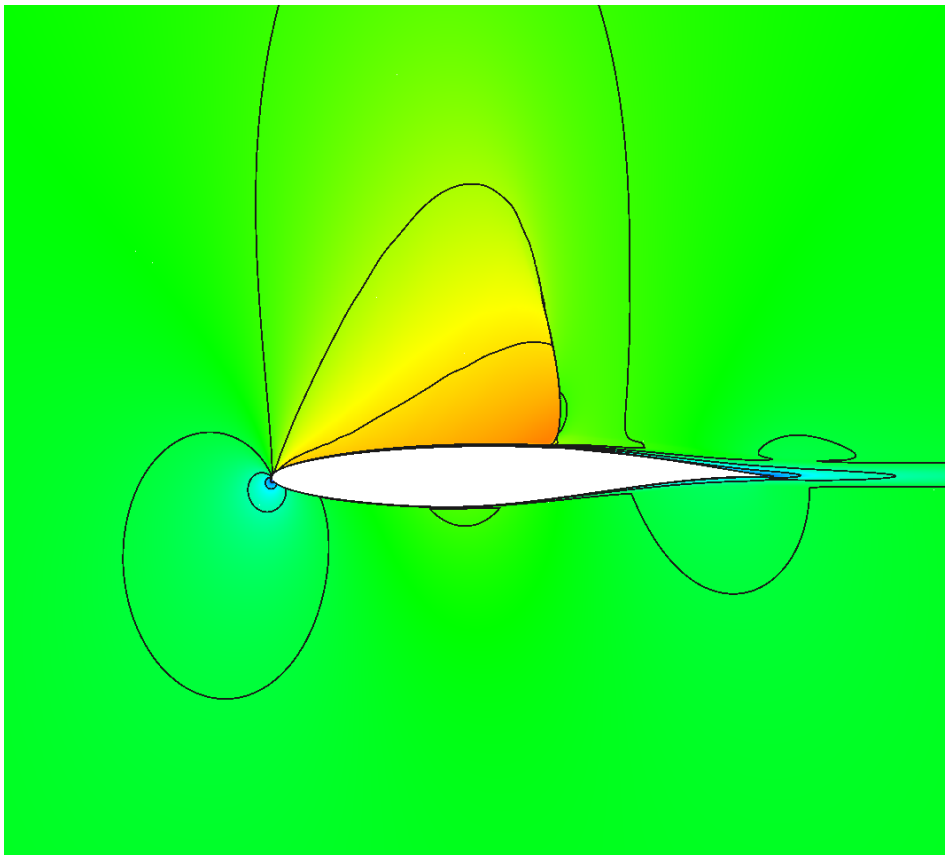
Case 2.2
Steady Turbulent Transonic flow over an RAE Airfoil

Summary

The case

Transonic RANS flow over an RAE 2822 airfoil

- $M_\infty = 0.734$
- $\alpha = 2.79^o$
- $Re = 6.5 \times 10^6$
- Chose to run fully turbulent
- Farfield distance is about $200c$ for the posted meshes



Mach number contours

The codes

MIT

- DG, SA turbulence model (asymptotically dual consistent)
- Farfield 20000c away

UMich

- DG, SA turbulence model (dual inconsistent)
- Farfield 200c away (workshop meshes)

Bergamo

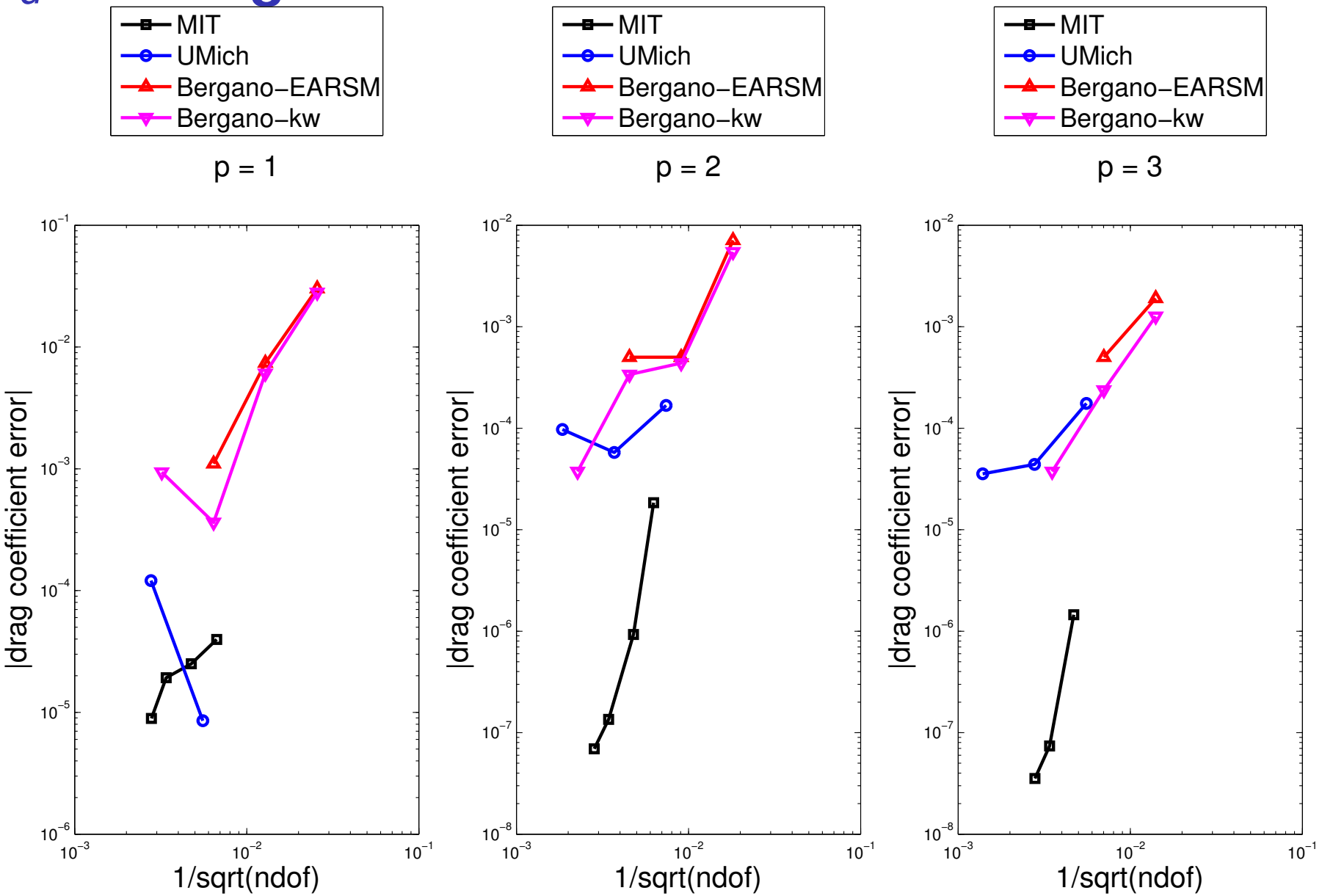
- DG, $k-\omega$ and EARSM turbulence models
- Farfield 200c away (workshop meshes)

Different reference values

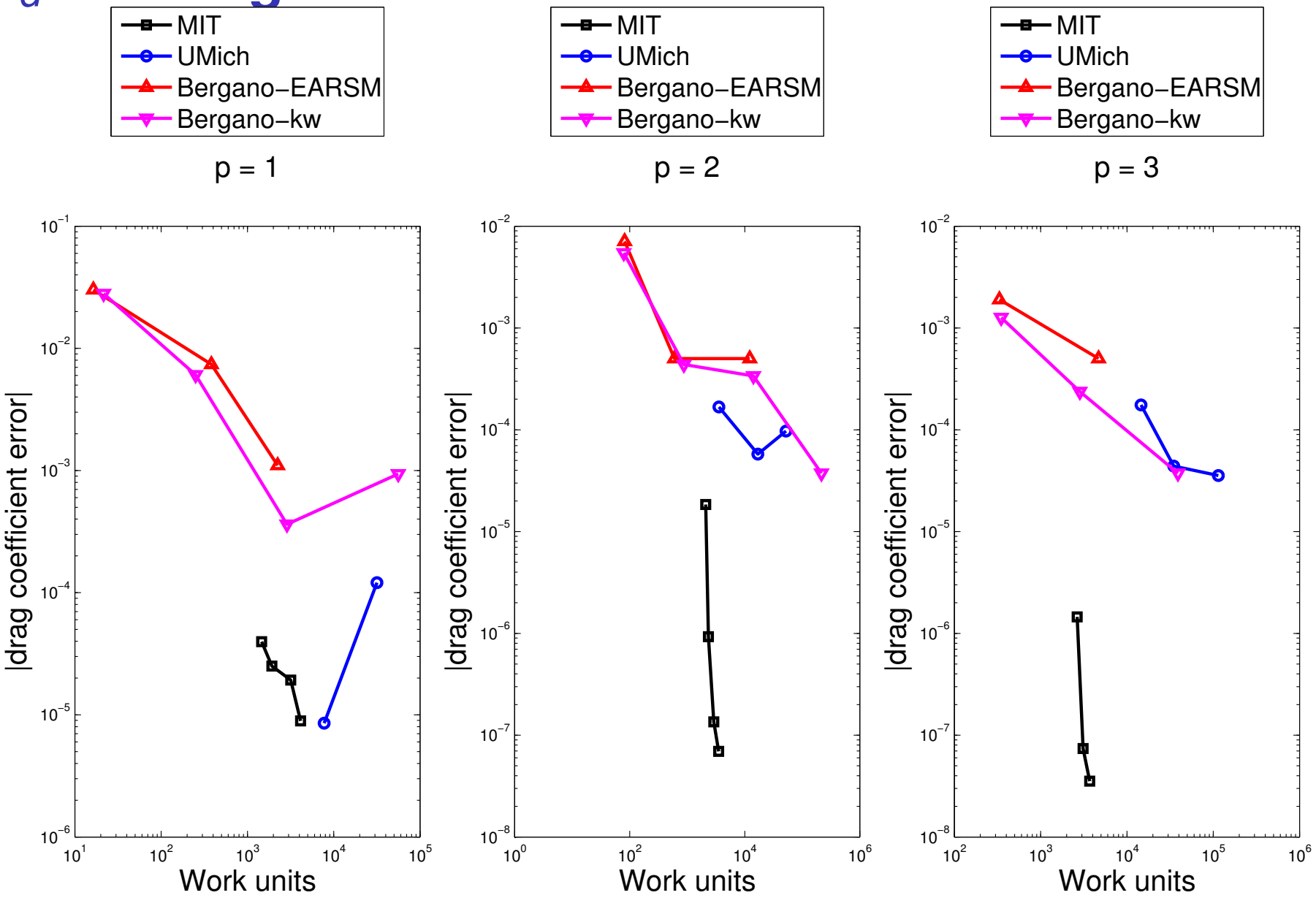
- Different farfield boundary locations
- Different turbulence models (and freestream turbulence levels)
- Different shock capturing techniques
- Numerical errors ...

Group	c_d	c_l
MIT	0.0184	0.823
UMich	0.0191	0.798
Bergamo (EARSM)	0.0168	0.803
Bergamo ($k-\omega$)	0.0206	0.854

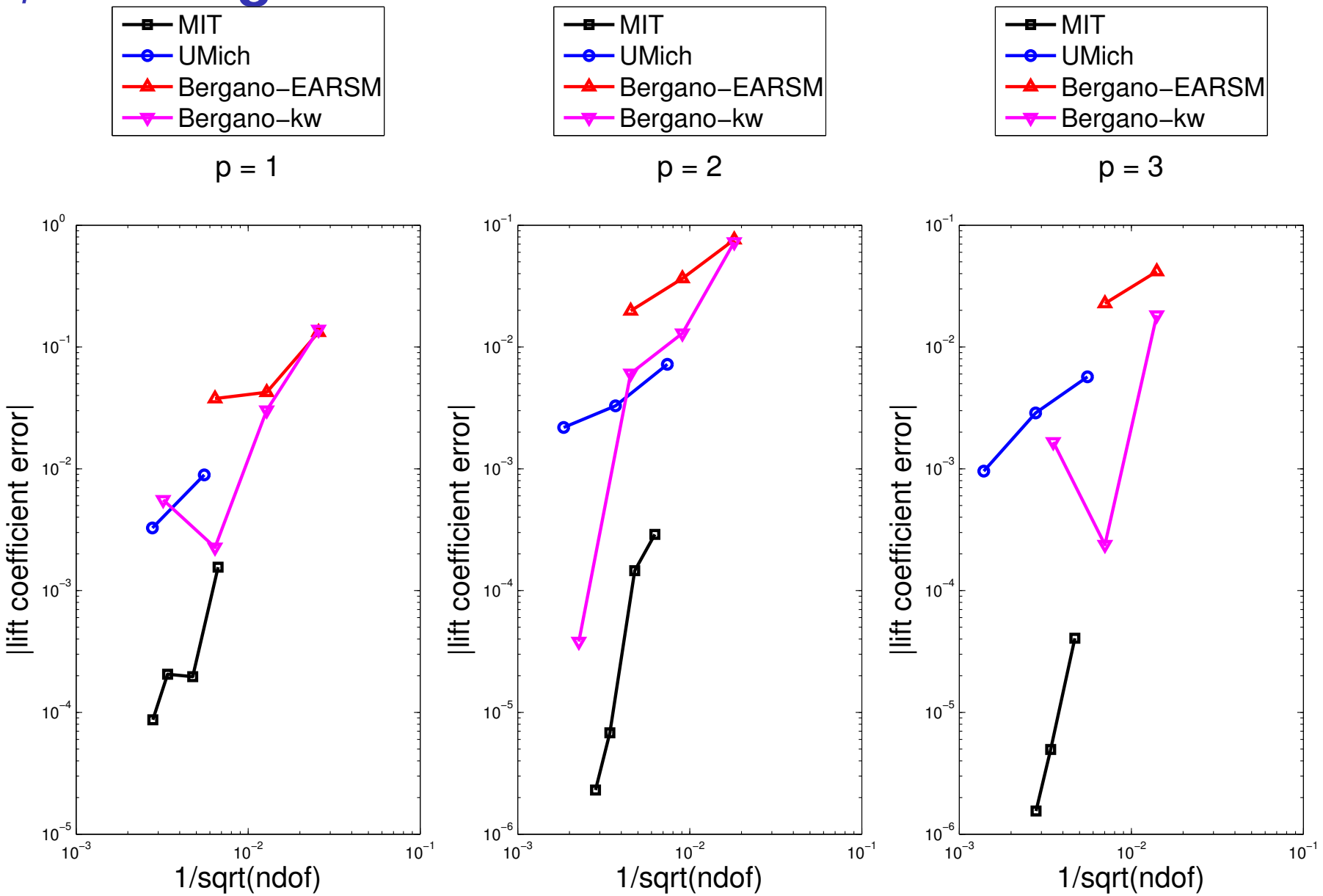
c_d convergence with DOF



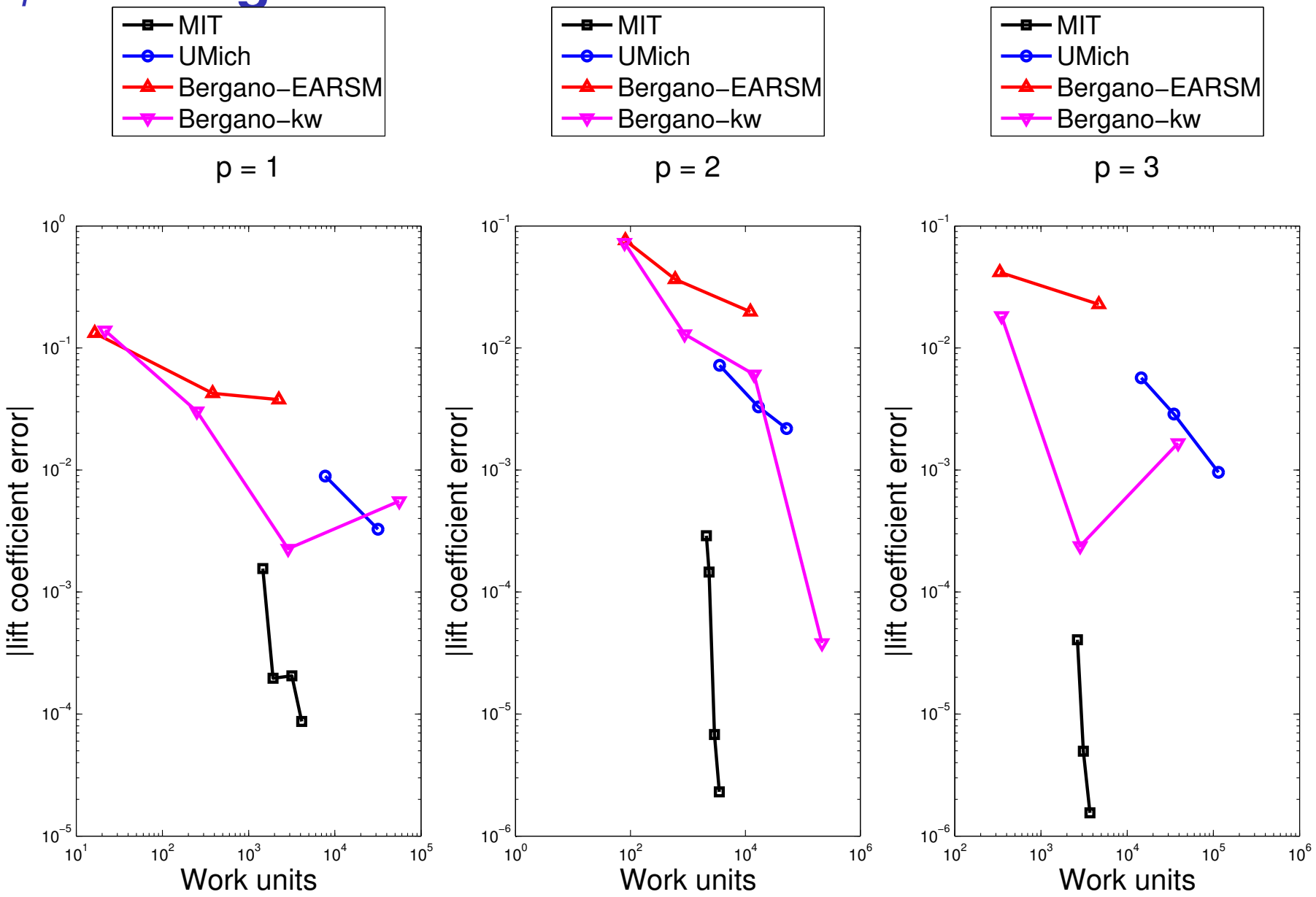
c_d convergence with WU



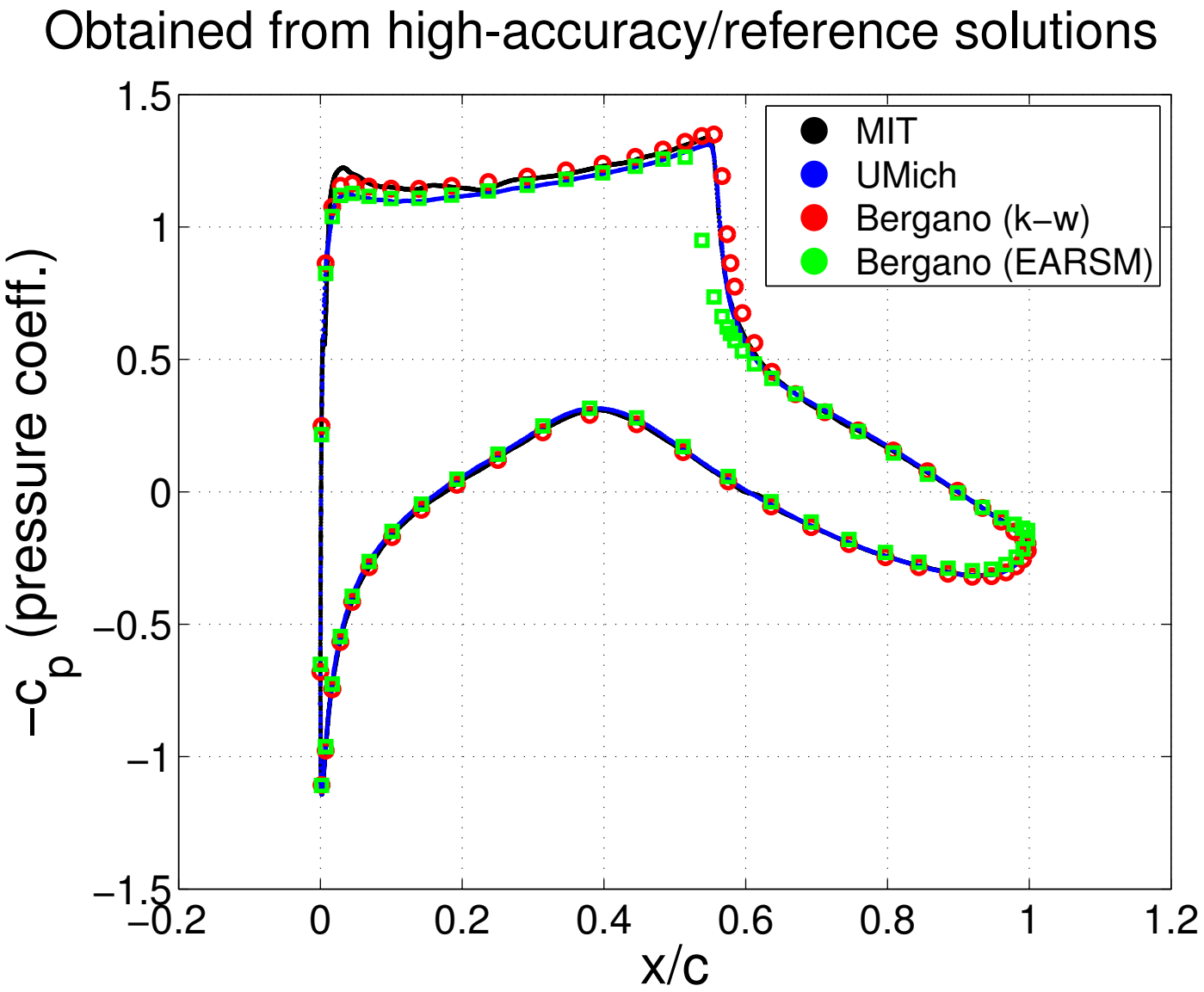
c_l convergence with DOF



c_l convergence with WU



Pressure coefficient distribution



Skin-friction coefficient distribution

Obtained from high-accuracy/reference solutions