

Contract No.: GTC1-CT99-10030	<b>A THEMATIC NETWORK FOR QUALITY AND TRUST IN THE INDUSTRIAL APPLICATION OF CFD</b>	JUN 25, 2002
Document Code:	UFR Quality Review Checklist (D33)	QQ/agh

# **QNET-CFD**

*A Thematic Network for Quality and Trust  
in the Industrial Application of  
Computational Fluid Dynamics*

**UFR QUALITY REVIEW CHECKLIST  
(TEMPLATE FOR D33)**

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**INSTRUCTIONS TO THE REVIEWER**

Please indicate your agreement or disagreement with the comments below, by ticking either the YES or NO box (using symbol ). If you would like to comment on any of the questions, please also tick the CO (comment) box, and add your comments in the box provided at the end of each section. Please make sure that all questions are answered.

When you have completed the review, please indicate below your overall judgment of the UFR and its documentation:

Accept

Reject

Accept provided the following conditions are met

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<b>Underlying Flow Regime Title:</b>	<b>The under-expanded jet</b>
<b>UFR Author and UFR number:</b>	<b>Dr J Kidger, HSL, UFR 1-01</b>
<b>Reviewer (Name/Organisation) :</b>	<b>Prof. Dr.-Ing. M. Sommerfeld, MLU-Halle</b>

<b>1</b>	<b>TOP LEVEL CHECK</b>	<b>YES</b>	<b>NO</b>	<b>CO</b>
1. 1	Is the selected test-case study a good representation of the assigned UFR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1. 2	Does the test-case study include both flow measurements and CFD calculations?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1. 3	Does the document under review comply with the D32 template	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1. 4	Should any parts be expanded, condensed or deleted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
1. 5	Are the illustrations and their captions clear and informative?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1. 6	Are the references adequate and complete?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1. 7	If any hyperlinks are used, do these function correctly?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b>				

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### DETAILED CHECK

2	REVIEW OF UFR STUDIES AND CHOICE OF TEST CASE	YES	NO	CO
2.1	Have past studies of the UFR been reviewed adequately?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2.2	Is the chosen test-case study selected from an established database or comparison exercise?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2.3	Have the test-case experiments been devised for CFD validation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b> 2.1 I don't know, but I hope				

3	DESCRIPTION OF THE STUDY TEST CASE	YES	NO	CO
3.1	Is the geometry described adequately, including an appropriate sketch?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3.2	Are the flow parameters defining the flow regime specified?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3	Are the principal measured quantities (i.e. those by which success or failure of CFD is to be judged) specified?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4	Is the description fully self-contained and sufficiently detailed ? (the level of detail required depends on whether a hyperlink to a detailed database is provided)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Comments:</b> 3.1 More geometrical details of the converging-diverging nozzle should to be provided, e.g. length of diverging part, angle of divergence, geometry of the through.				
<p>Comment by UFR author: Geometrical details of the <u>shape</u> of the converging-diverging nozzle used by Seiner &amp; Norum (1979,1980) are not referenced. However the authors state they used design guidelines (unreferenced) and a method of characteristics to ensure that the flow was parallel and supersonic at the stated Mach number at the nozzle exit. The situation is similar for the converging nozzle used by Donaldson &amp; Snedecker (1971). There is no reason to suspect that the nozzles were not well designed and gave the stated performance. This being the case, CFD simulations can be undertaken without geometrical details of the upstream part of these nozzles: The domain boundary can be coincident with the nozzle exit. Because the flow is choked at the nozzle exit, no information from the downstream computation can propagate upstream into the nozzle.</p>				

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<b>4</b>	<b>TEST CASE EXPERIMENTS</b>	<b>YES</b>	<b>NO</b>	<b>CO</b>
4. 1	Is the test-case facility described adequately?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. 2	Are the measurement techniques explained?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. 3	Is the quality/accuracy of the measured data discussed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. 4	Are the following quality aspects addressed in this discussion :-			<input checked="" type="checkbox"/>
a)	Closeness of flow to target/design conditions?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b)	Accuracy estimation of measured quantities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c)	Checks on global conservation of conserved quantities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d)	Consistency in the measurements of different quantities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
e)	Other (briefly describe)			<input type="checkbox"/>
4. 5	Is the evidence of data quality judged to be sufficient?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. 6	Is the information provided at the flow boundaries sufficient to specify or estimate reasonably well the boundary conditions required for a CFD calculation?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. 7	Is the overall discussion self-contained and sufficiently detailed? (the level of detail required depends on whether a hyperlink to a detailed database is provided)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Comments:**

4.4 This information was not provided in the respective references.

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<b>5</b>	<b>CFD METHODS</b>	<b>YES</b>	<b>NO</b>	<b>CO</b>
5. 1	Is an overview given of the methods used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. 2	Have the following aspects of the methods used been explained adequately:-			
a)	The codes employed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b)	The turbulence/physical models used?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c)	The wall treatments applied?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d)	The numerical boundary conditions?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. 3	Are comments made on how well the boundary conditions replicate conditions in the test rig?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. 4	Is the quality of the calculations discussed?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. 5	Are the following quality aspects addressed in this discussion?			<input type="checkbox"/>
a)	The discretisation scheme(s) and solver(s)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b)	The sufficiency of grid resolution(s) ?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c)	Sensitivities to uncertainties in the boundary conditions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d)	Comparisons between separate calculations using the same physical model	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e)	Other (briefly describe)			<input type="checkbox"/>
5. 6	Is the evidence of CFD quality judged to be sufficient in all cases?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Comments:**

5.5 d) such information was not available in the associated references

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<b>6</b>	<b>COMPARISON OF CFD CALCULATIONS WITH EXPERIMENT</b>	<b>YES</b>	<b>NO</b>	<b>CO</b>
6.1	Are key comparisons of CFD results with experiment presented in the form of tables or plots?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.2	Do these comparisons include the assessment quantities?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.3	Are further comparisons available via hyperlinks to a results database?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6.4	Is the performance of the CFD calculations judged by comparison with experiments discussed and analysed in all cases?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Comments:**

<b>7</b>	<b>BEST PRACTICE ADVICE FOR THE UFR</b>	<b>YES</b>	<b>NO</b>	<b>CO</b>
7.1	Are model abilities for this test case discussed and analysed in sufficient detail?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.2	Are recommendations provided on which models should be used for this UFR?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.3	Are these recommendations supported by the evidence?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Comments:**