

Traceability for computationally-intensive metrology

## TraCIM DATABASE

TOTAL	
Domains	7
Applications	20
Aims	79

DOMAIN	AIMS
Length	46
Chemistry	8
Electricity and Magnetism	5
Temperature	2
Mass	4
Radiometry	1
Interdisciplinary metrology	13

No	Partner	Domain	Application	Aim	Description	Priority criterion	Similar applications A = Least squares, Gauss, Bestfit B = Surface/profile roughness C = Chebyshev fit D = Interlaboratory comparison	Selection
1	NPL	Length	Surface metrology	Profile roughness parameters			B	
2	NPL	Length	Surface metrology	Form removal				
3	NPL	Length	Surface metrology	Filtering				
4	NPL	Length	Dimensional Metrology	Bundle adjustment	Photogrammetry, laser trackers, multilateration, iGPS			
5	NPL	Chemistry	Chemometrics	Principle components analysis/regression				
6	NPL	Chemistry	Chemometrics	Partial least squares				
7	NPL	Chemistry	Chemometrics	Subset selection algorithms				
8	NPL	Electricity and Magnetism	Power generation	State estimation algorithms				
9	NPL	Thermometry	Temperature	Calibration of PRTs				
10	NPL	Thermometry	Temperature	Definition of practical temperature scale				
11	NPL	Interdisciplinary metrology	Regression	Calibration functions	Various uncertainty structures			
12	NPL	Interdisciplinary metrology	Regression	Linear least squares				
13	NPL	Interdisciplinary metrology	Regression	Nonlinear least squares				
14	NPL	Interdisciplinary metrology	Regression	Robust regression				
15	NPL	Interdisciplinary metrology	Uncertainty evaluation	LPU/GUM	Law of propagation of uncertainty			

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16	NPL	Interdisciplinary metrology	Uncertainty evaluation	MCM/GUMS1	Monte Carlo method			
17	NPL	Interdisciplinary metrology	Uncertainty evaluation	MCMC	Marko chain Monte Carlo			
18	NPL	Interdisciplinary metrology	Uncertainty evaluation	Analysis of interlaboratory comparisons			D	
19	NPL	Mass	Mass calibration					
20	NPL	Mass	Calibration of pressure balances					
21	PTB	Length	Coordinate Metrology	Least-squares fit	Best-Fit for standard elements (2D and 3D)	SW-manufacturers/end users	A	
22	PTB	Length	Coordinate Metrology	Chebyshev fit	Best-Fit for standard elements (2D and 3D)	SW-manufacturers/end users	C	
23	PTB	Length	Coordinate Metrology	Involute gear inspection	Profile, helix, pitch	SW-manufacturers/end users		
24	PTB	Length	Surface Metrology	Surface roughness parameters	Calculate surface roughness parameters	SW-manufacturers/end users	B	
25	PTB	Electricity and Magnetism	HF measuring techniques	Calibration algorithms	Caclulate HF scattering parameters	NMIs, manufacturers		
26	PTB	Interdisciplinary metrology	Intercomparison on CMC level	BIPM metrology	Calculation of key comparison reference values, En-values and other interesting parameter	General metrology NMIS		
27	PTB	Interdisciplinary metrology	Intercomparison on calibration laboratory level	Calibration service	En-values	General metrology calibration services	D	
28	PTB	Interdisciplinary metrology	all	General	Noise reduction	Spline filter, RC filter, Gaussian filter, and other		
29	PTB	Interdisciplinary metrology	all	General statistics	Mean, standard deviation, regression, etc.			
30	CMI	Length	Surface metrology	Free-form profile parameters	Calculate profile characteristics of free-form surface	Desire from end-users		
31	UM	Mass	Flow: PIV-particle image velocimetry	Checking SW for flow velocity evaluation	Recognition of particle position in an image and veLOCITY calculation	Desire from end-users		

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32	UM	Mass	Tension and compression measurements on different materials	Checking SW for material properties evaluation	Calculation of material properties (tensile strength, compressive strength, plasticity etc.) based on force and extension measurements	Desire from end-users (many different testing machine producers - at least 20)		
33	VSL	Length	Dimensional Metrology	Least-squares fit simple geometric elements	Calculate parameters of best fit simple geometric elements, with lowest RMS value.	Interest of CMM-software manufacturers	A	
34	VSL	Length	Dimensional Metrology	Chebyshev fit simple geometric elements	Calculate parameters of best fit simple geometric elements, with lowest PV value.	Interest of CMM-software manufactures	C	
35	VSL	Length	Dimensional Metrology	Least-squares fit aspheric and free-form lenses	Calculate best fit position and orientation of nominal lens form to measurement data, with lowest RMS value.	Interest of CMM-software manufactures	A	
36	VSL	Length	Dimensional Metrology	Chebyshev fit aspheric and free-form lenses	Calculate best fit position and orientation of nominal lens form to measurement data, with lowest PV value.	Interest of CMM-software manufactures	C	
37	VSL	Length	Dimensional Metrology	Least-squares fit gears	Calculate best fit position and orientation of nominal gear form to measurement data, with lowest RMS value.	Interest of CMM-software manufactures	A	
38	VSL	Length	Dimensional Metrology	Chebyshev fit gears	Calculate best fit position and orientation of nominal gear form to measurement data, with lowest PV value.	Interest of CMM-software manufactures	C	
39	VSL	Length	Dimensional Metrology	Least-squares fit quadric surfaces	Calculate best fit position and orientation of nominal surface form to measurement data, with lowest RMS value.	Interest of CMM-software manufactures	A	
40	VSL	Length	Dimensional Metrology	Chebyshev fit quadric surfaces	Calculate best fit position and orientation of nominal surface form to measurement data, with lowest PV value.	Interest of CMM-software manufactures	C	

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41	VSL	Length	Dimensional Metrology	Least-squares fit NURBS surfaces	Calculate best fit position and orientation of nominal surface form to measurement data, with lowest RMS value.	Interest of CMM-software manufactures	A	
42	VSL	Length	Dimensional Metrology	Chebyshev fit NURBS surfaces	Calculate best fit position and orientation of nominal surface form to measurement data, with lowest PV value.	Interest of CMM-software manufactures	C	
43	VSL	Length	Dimensional Metrology	Least-squares fit parameters quadric surfaces	Calculate best fit of parametrized surface form to measurement data, with lowest RMS value.	Interest of CMM-software manufactures	A	
44	VSL	Length	Dimensional Metrology	Chebyshev fit parameters quadric surfaces	Calculate best fit of parametrized surface form to measurement data, with lowest PV value.	Interest of CMM-software manufactures	C	
45	VSL	Length	Surface Metrology	Surface roughness parameters	Calculate surface roughness parameters	Interest of surface roughness measurement device manufacturers (?)	B	
46	VSL	Length	Surface Metrology	Step height	Calculate step height for AFM measurement data			
47	VSL	Length	Surface Metrology	Line width	Calculate line width for AFM measurement data			
48	VSL	Length	Surface Metrology	Side wall angle	Calculate side wall angle for AFM measurement data			
49	VSL	Length	Surface Metrology	Side wall roughness	Calculate side wall roughness for AFM measurement data			
50	VSL	Chemistry	Gas Chromatography	Peak area	Calculate gas chromatograph peak area, based on different definitions of peak area.	Interest of VSL chemistry department and possibly manufacturers of GCs.		
51	VSL	Chemistry	Cavity Ring Down Spectroscopy	Exponential decay time	Calculate exponential decay time including uncertainty.	Interest of VSL chemistry department and possibly manufacturers of gas monitors.		

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52	VSL	Chemistry	Spectroscopy general	Fit peaks to spectrum	Calculate best fit of data base measurement data to measured spectrum	Interest of VSL chemistry department and possibly manufacturers of gas monitors.		
53	VSL	Chemistry	Calibration curves ODR	Orthogonal distance regression	Calculate best fit curve (line) in orthogonal distance regression sense.	Used in many applications.		
54	VSL	Chemistry	Calibration curves polynomial fit	Fit polynomial	Calculate best fit polynomial (vertical least squares)	Used in many applications.		
55	VSL	Electricity and Magnetism	Mains power frequency	Mains frequency	Calculate four parameter sine fit for power and energy meters	NMIs, manufacturers		
56	VSL	Electricity and Magnetism	Power quality - frequency spectrum	Power quality - frequency spectrum	Calculate spectrum of mains electrical power	NMIs, manufacturers		
57	VSL	Electricity and Magnetism	Vector Network Analyzer	Calibration algorithms	Verify calculations of VNA calibration	NMIs, manufacturers		
58	VSL	Radiometry	Radiometry	color-coordinates, color temperatures	Calculate color-coordinates and temperatures, correlated color temperature, color quality indices, etc.	NMIs		
59	VSL	Interdisciplinary metrology	Flow	ISO and AGA norms	Calculate density, calorific value, flow rate, etc.	Flow computer manufacturers		
60	HEX	Length	Dimensional Metrology	Transformation	Gauss-Fit for 3D-profiles		A	
61	HEX	Length	Dimensional Metrology	Transformation	Chebyshev-Fit for 3D-profiles		C	
62	HEX	Length	Dimensional Metrology	Max/Min-Deviation	Actual-Nominal Comparison for 3D-Profiles			
63	HEX	Length	Dimensional Metrology	Transformation	Best-Fit for standard elements (2D and 3D)	SW-manufacturers/end users	A	
64	HEX	Length	Dimensional Metrology	ISO-Element	Form calculation for Torus, Sphere, Roundness			

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65	Werth	Length	Dimensional Metrology	Assignment of standard forms	Evaluation of the calculation of distances and position of different standard form elements	Required by customers		
66	WHZ	Length	Coordinate Metrology	Parameters of minimum zone, maximum inscribed- and minimum circumscribed elements	Calculation of contact points and points with predefined deviations		C	
67	WHZ	Length	Coordinate Metrology	Form and tolerance assesment for multi component features	Calculation of contact points and points with predefined deviations			
68	ZEISS	Length	Coordinate Metrology	Circle 3D	Orthogonal distance regression	Desire from end-users	A, C	
69	ZEISS	Length	Coordinate Metrology	Cone	Orthogonal distance regression	Desire from end-users	A, C	
70	ZEISS	Length	Coordinate Metrology	Cylinder	Orthogonal distance regression	Desire from end-users	A, C	
71	ZEISS	Length	Coordinate Metrology	Hexagon 3D	Orthogonal distance regression	Desire from end-users	A, C	
72	ZEISS	Length	Coordinate Metrology	Plane	Orthogonal distance regression	Desire from end-users	A, C	
73	ZEISS	Length	Coordinate Metrology	Line 3D	Orthogonal distance regression	Desire from end-users	A, C	
74	ZEISS	Length	Coordinate Metrology	Rectangle 3D	Orthogonal distance regression	Desire from end-users	A, C	
75	ZEISS	Length	Coordinate Metrology	Line 3D	Orthogonal distance regression	Desire from end-users	A, C	
76	ZEISS	Length	Coordinate Metrology	Sphere	Orthogonal distance regression	Desire from end-users	A, C	
77	ZEISS	Length	Coordinate Metrology	Step cylinder	Orthogonal distance regression	Desire from end-users	A, C	
78	ZEISS	Length	Coordinate Metrology	Symmetry plane	Orthogonal distance regression	Desire from end-users	A, C	
79	ZEISS	Length	Coordinate Metrology	Torus	Orthogonal distance regression	Desire from end-users	A, C	