Measuring and mapping of architectural constructions fronts using digital camera

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Photogrammetrical methods are widely using for architectural constructions survey, their measuring and mapping for reconstruction and restoration of buildings.

The range of experimental works were done in Photogrammetry Department of Moscow University of Geodesy and Cartography (MIIGAIK) on using of digital non-metric cameras for architectural buildings survey and mapping.

The building of architect Kazakov was surveyed in Gorokhovsky Street. The survey was executed by photogrammetric camera UMK 13X18 with focus 100mm, and digital cameras Canon (6Mp, F=3000pixel), Olympus (2Mp, F=1700pixel), Mamiya (16Mp, F=5000pixel). The prior digital camera's calibration was done as well as inner orientation parameters and distortions were measured.

Control points geo-referencing were done by electronic tacheometer with 5mm accuracy. The distance from survey station to building front was 20m.

The results were processed using digital photogrammetric system PHOTOMOD, version 3.11 in the following steps: photo-triangulation, front building mapping in stereo vectorization mode, photo-plans producing.

Photo triangulation results are shown in table #1.

Table #1

Camera	Residual horizontal parallax in models (pixel)	Tie points measurements differences between stereopairs (mm)			Control points measurements differences (mm)		
		$m_{x,y}$	m_z	m_z/H	$m_{x,y}$	m_z	m_z/H
UMK13X18	4mkm	-	-	-	13	7	1/3000
Mamiya	0.1-0.2	1.4	1.3	1/15000	8	9	1/3000
Canon	0.1-0.2	1.1	1.2	1/15000	9	8	1/3000
Olympus	0.2	5	8	1/2500	17	15	1/1700

Photo-plan of building front fragment in 1:20 scale with vector layer overlapping is shown on figure #1.

Fig. 1

The results obtained allow to conclude that calibrated digital cameras are quite able for buildings fronts mapping with needed accuracy, and photo-plans in their metric features compare well with large scale plans, produced by stereo vectorization.

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