A FAMILY OF TWENTY-AMPERES POWER SUPPLIES FOR MULTI-POLE CORRECTORS FOR ACCELERATORS AND STORAGE RINGS

O. Belikov, V. Kozak, A. Medvedko

BINP SB RAS

PERFORMANCE OBJECTIVES

TWENTY-AMPERES POWER SUPPLIES

- 50V
- 100V
- 150V

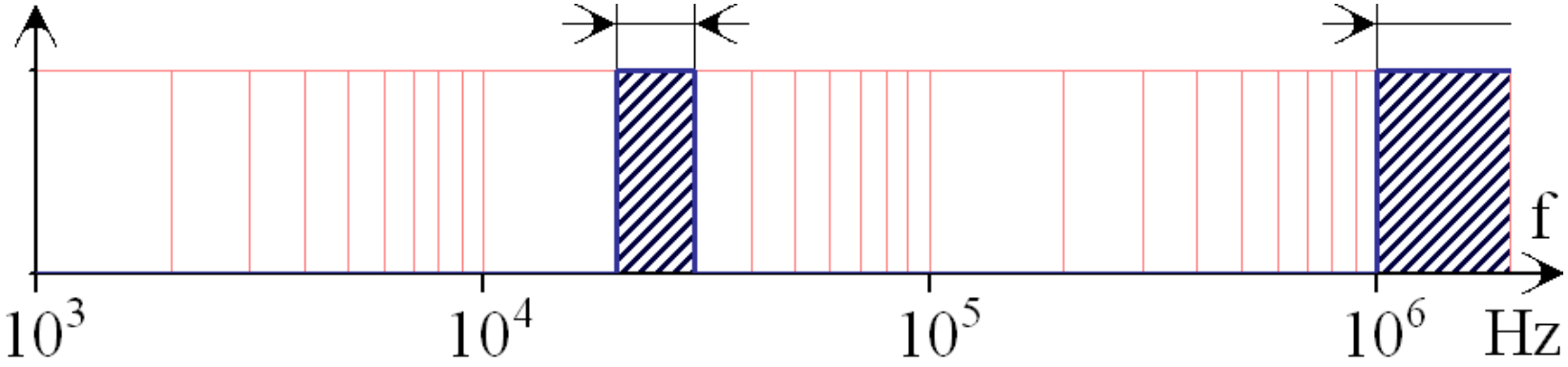
CURRENT INSTABILITY

- Static error: ≤0,1%
- Dynamic error: ≤1%

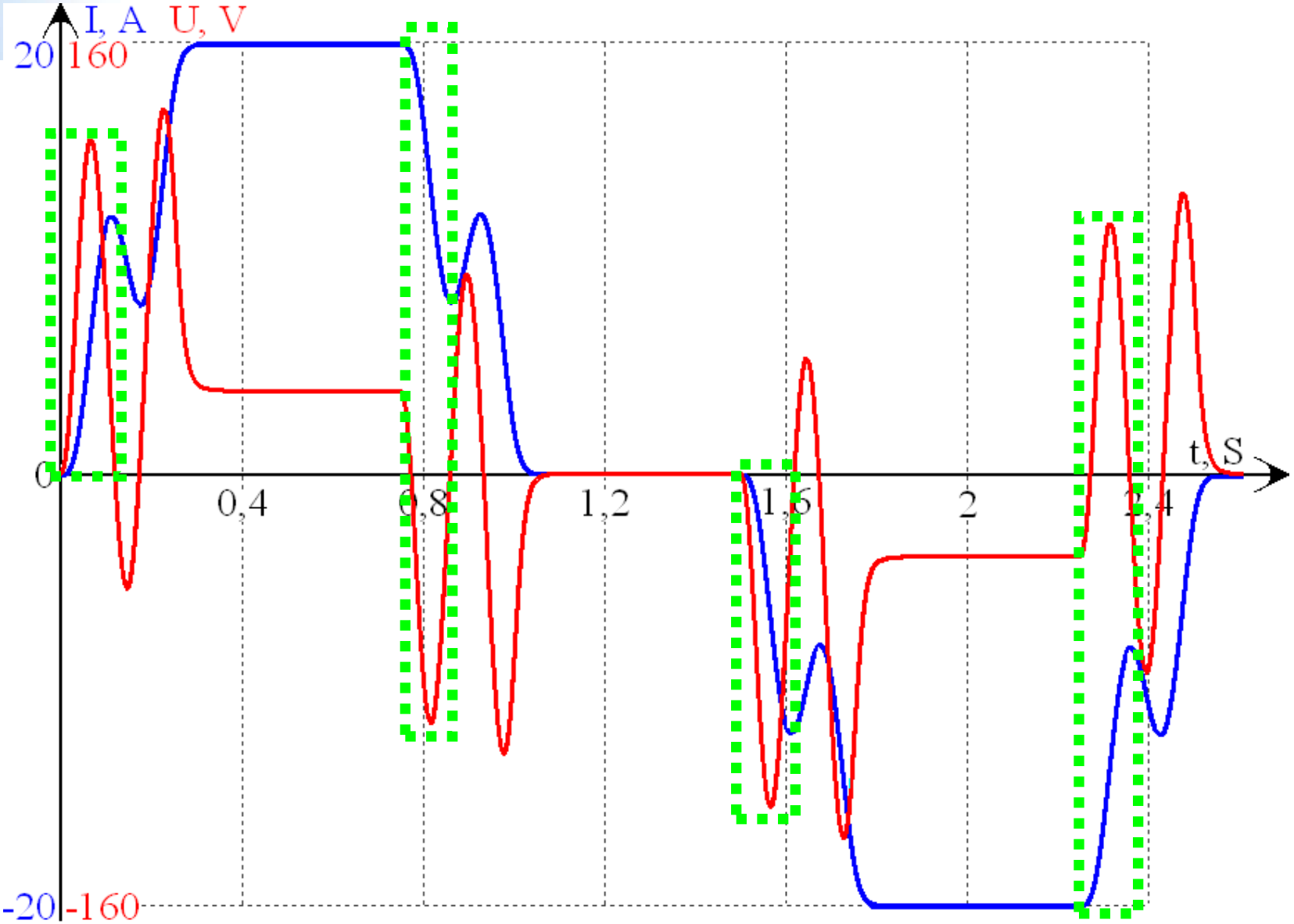
CURRENT RIPPLE

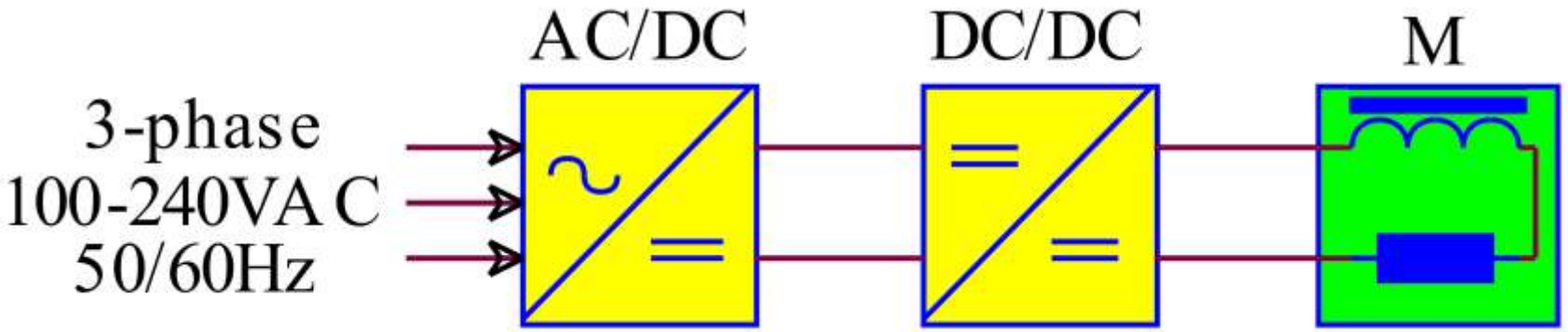
$10kHz \le \nu_s \le 30kHz$

$Q_{X,Z} \ge 1MHz$



CURRENT DIAGRAM

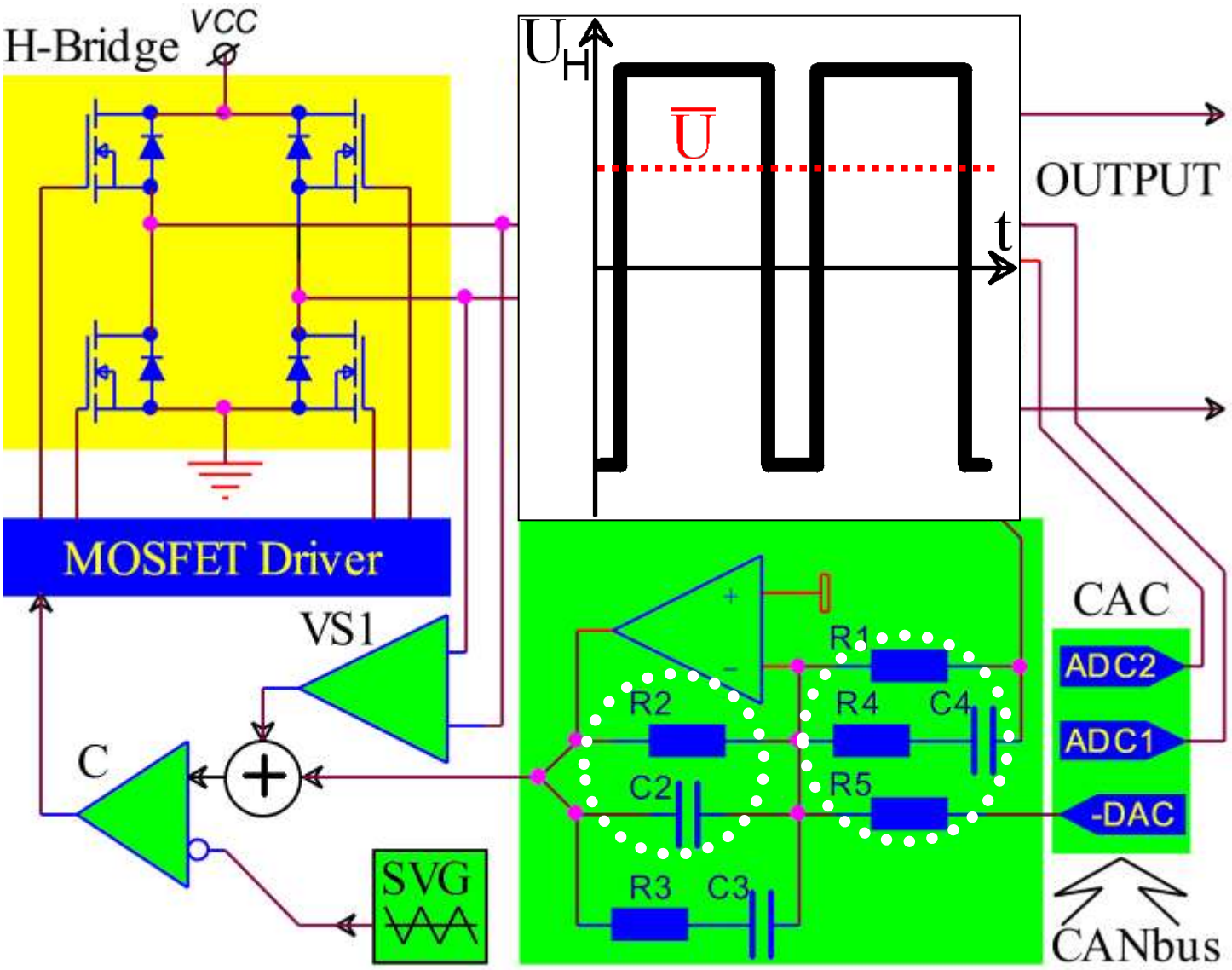


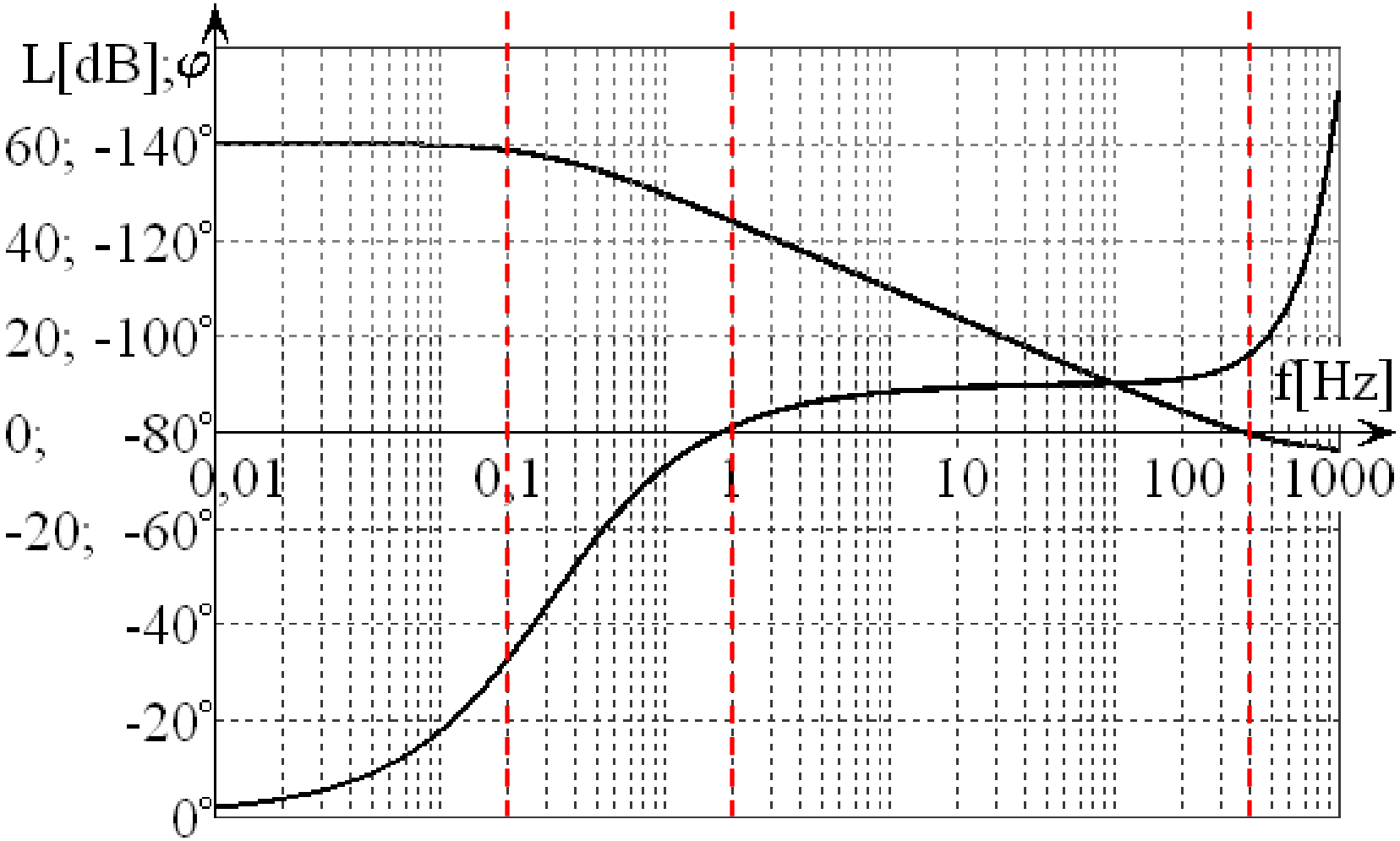


AC/DC – *Alternating current / Direct current and*
DC/DC – *Direct current / Direct current convertors*
M – *Electromagnet*

CURRENT SOURCE STRUCTURE BINP SB RAS

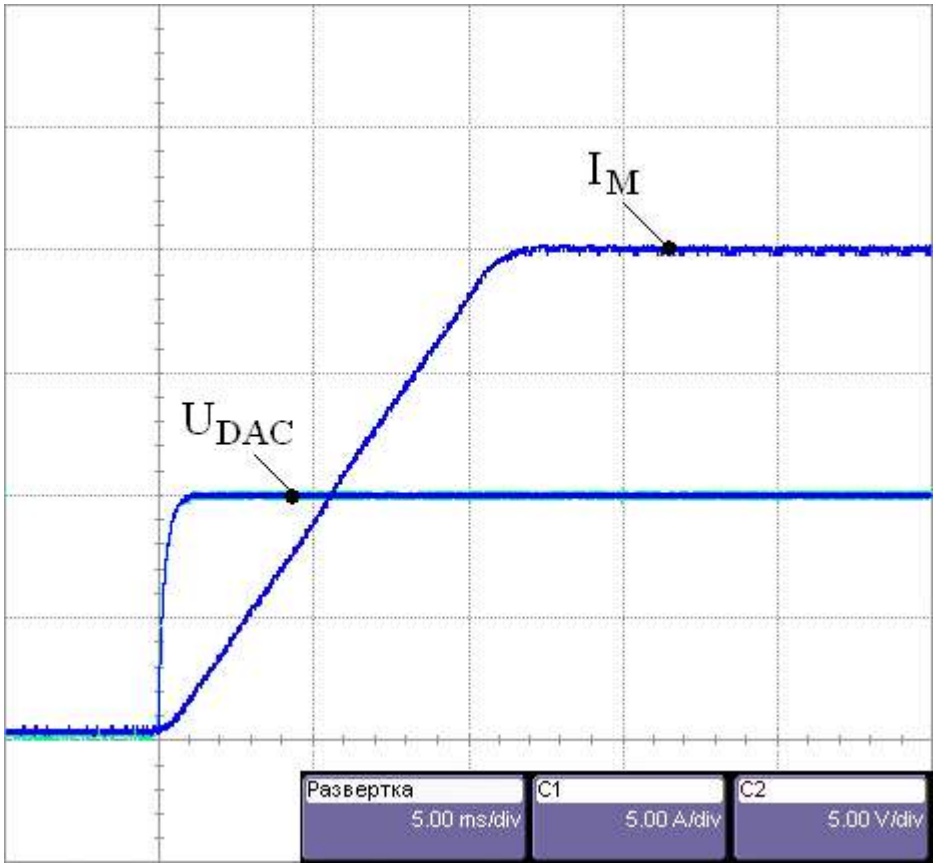
H-Bridge – *H-Bridge inverter*
LPF – *Low-pass filter*
HCS – *Hall Current Sensors*
VS – *Voltage sensor*
ESA – *Error-signal amplifier*
CAC – *Controller with the CANbus interface*
ADC – *Analog-to-digital converter*
DAC – *Digital-to-analog converter*
C – *Comparator*
SVG – *Sawtooth-voltage generator*





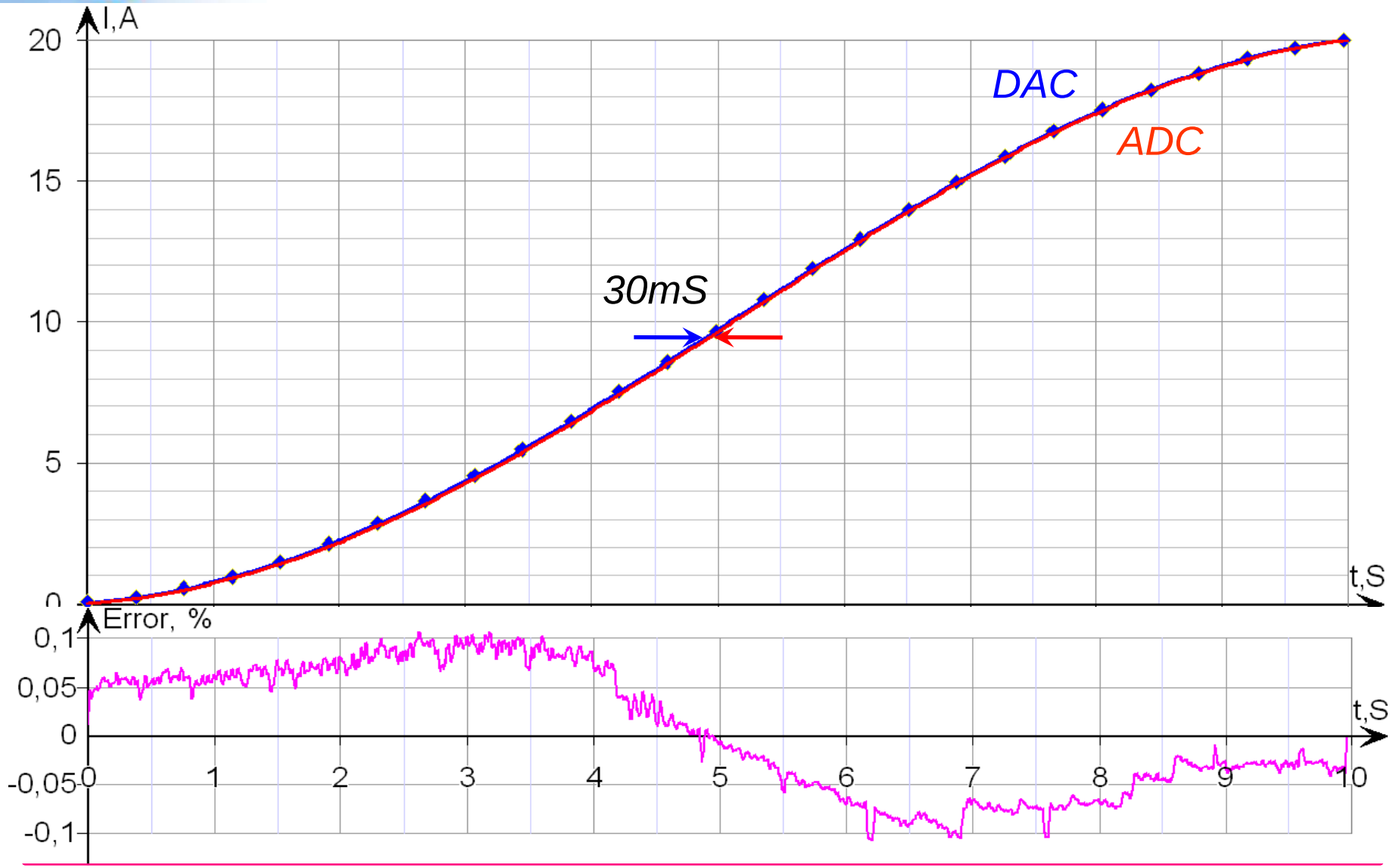
L – *Gain-frequency response* **φ** – *Phase-frequency characteristic*

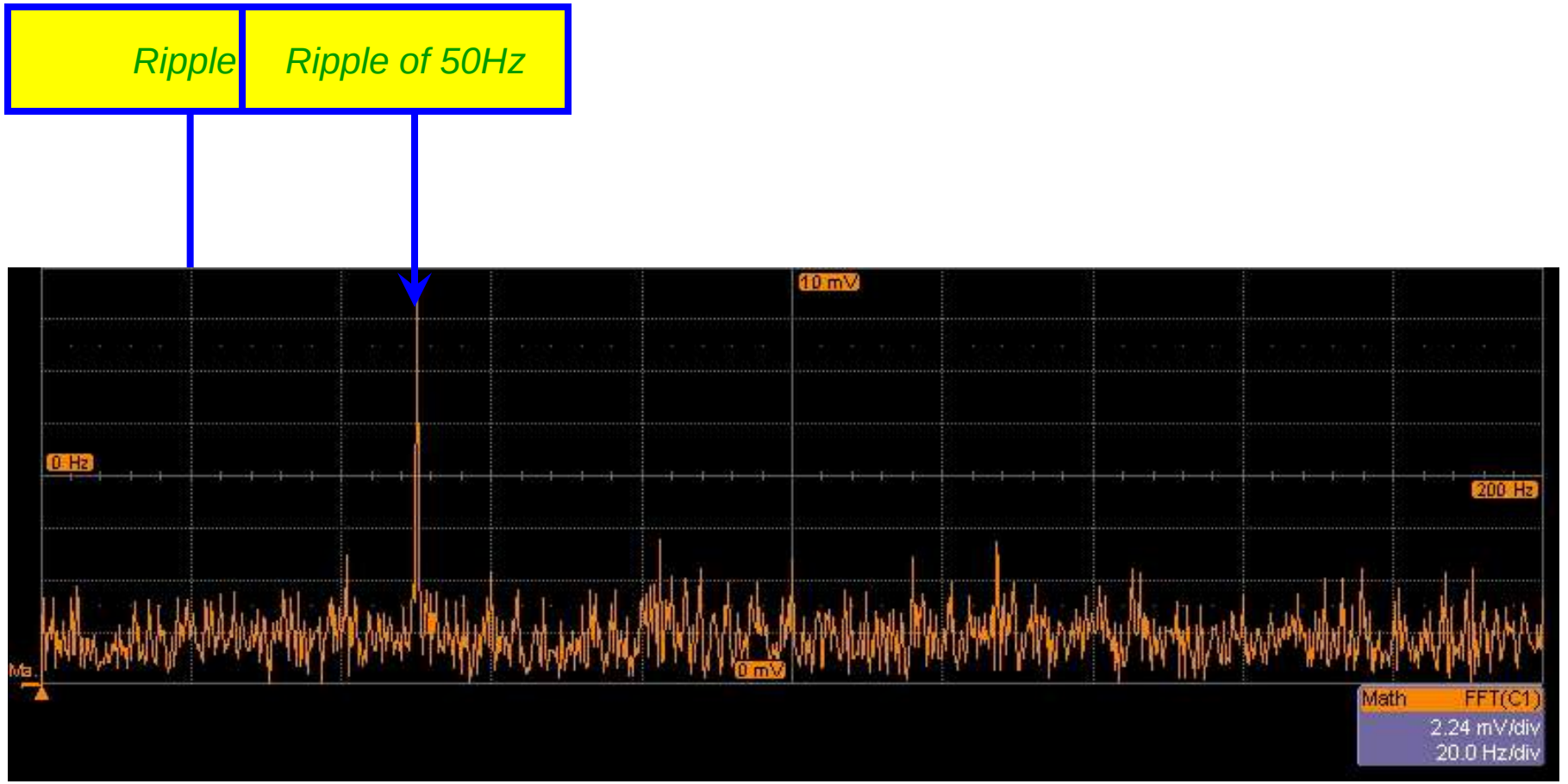
- dynamic control
- static control



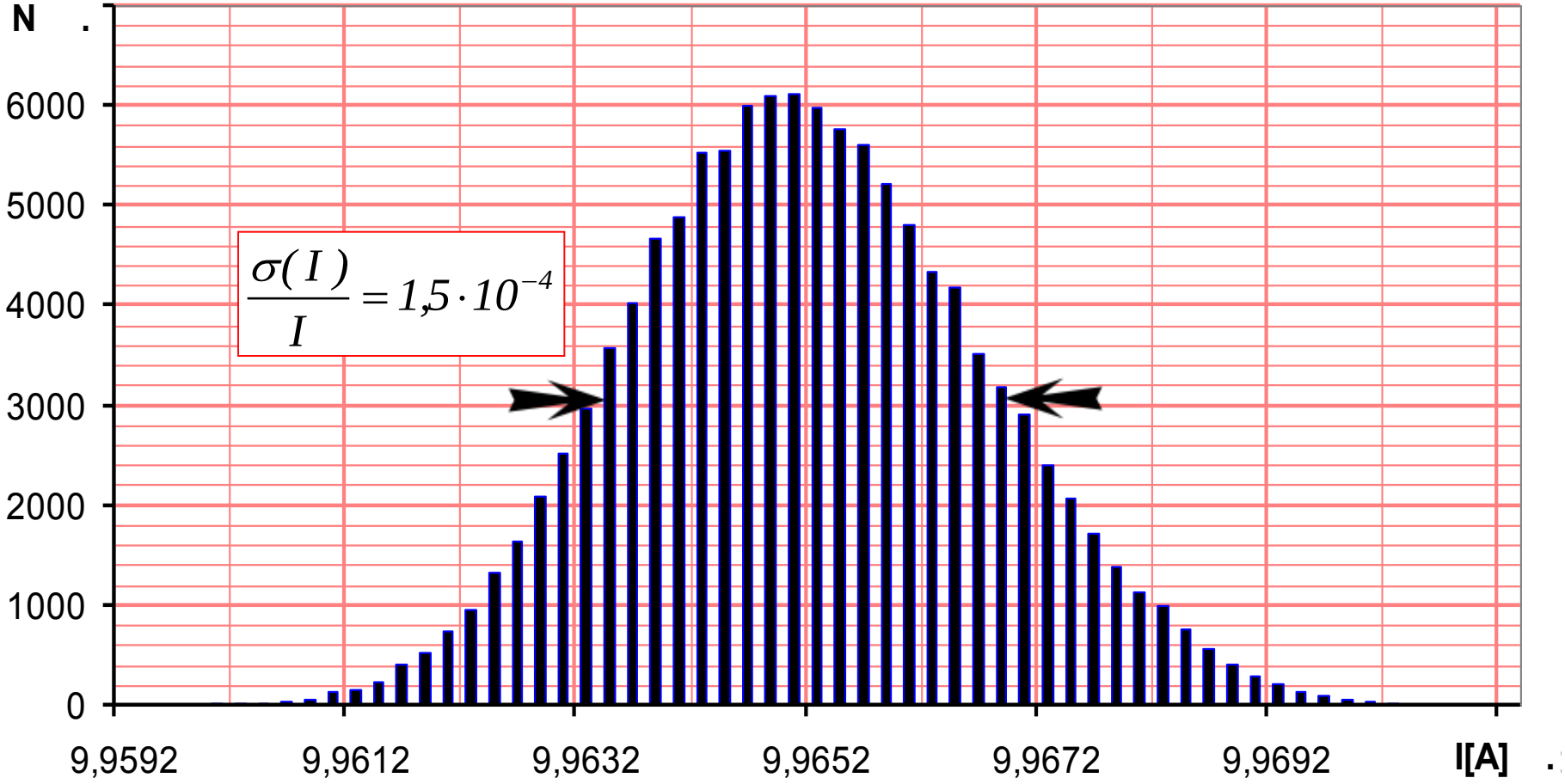
- dynamic control

$I(t) = 20(1 - \cos(2\pi \cdot 0{,}1 \cdot t))$




Ripple
Ripple of 50Hz
10 mV
0 Hz
200 Hz
0 mV
Math FFT(C1)
2.24 mV/div
20.0 Hz/div

Instability / 24 hours



3U-subunit: 432×355×133mm

Mains: 220/380VAC and 120/208VAC, 50/60Hz

The control via the CANbus

MPS-20-150 AND MPS-20-100

BINP SB RAS

POWER SUPPLY SYSTEM

BINP SB RAS

PARAMETRS OF THE MPS-20

Parameters		Magnet Power Supply		
I_{OUT}	Output current	±20A		
U_{OUT}	Output voltage	**MPS-20-50**	**MPS-20-100**	**MPS-20-150**
		±50V	±100V	±150V
f_{PWM}	Conversion frequency	50kHz		
X_G	Current accuracy	0,1% от I_{MAX}		
σ	Output current dispersion	100ppm от I_{MAX} *for the 10hours*		
TCI_{OUT}	Thermal drift of I_{OUT}	40ppm/K		
P_D	Heat loss	**MPS-20-50**	**MPS-20-100**	**MPS-20-150**
		≤150 W	≤250 W	≤350 W


A FAMILY OF
TWENTY-AMPERES POWER SUPPLIES
FOR MULTI-POLE CORRECTORS
FOR ACCELERATORS
AND STORAGE RINGS
Thanks for your attention!