

THERMODYNAMICS SIMULATION FOR THE CW RADIO-FREQUENCY QUADRUPOLE ACCELERATOR

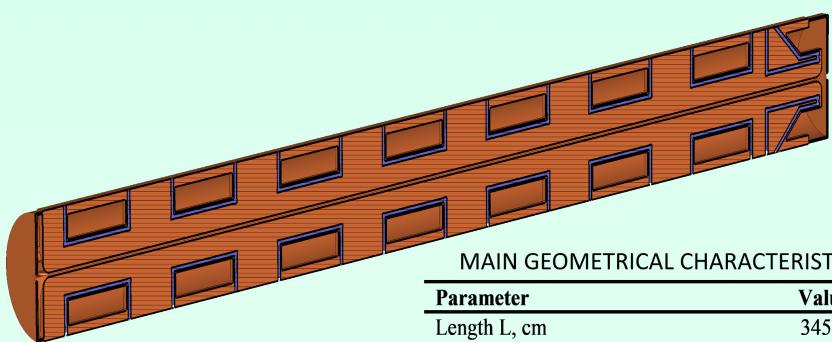
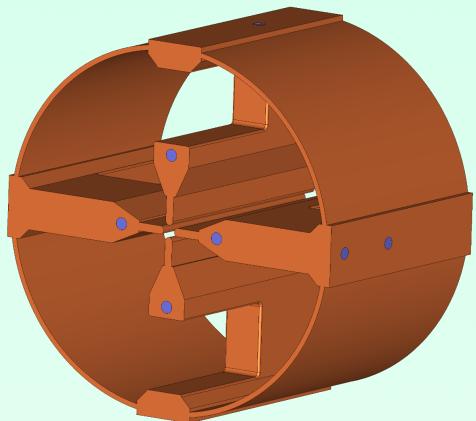
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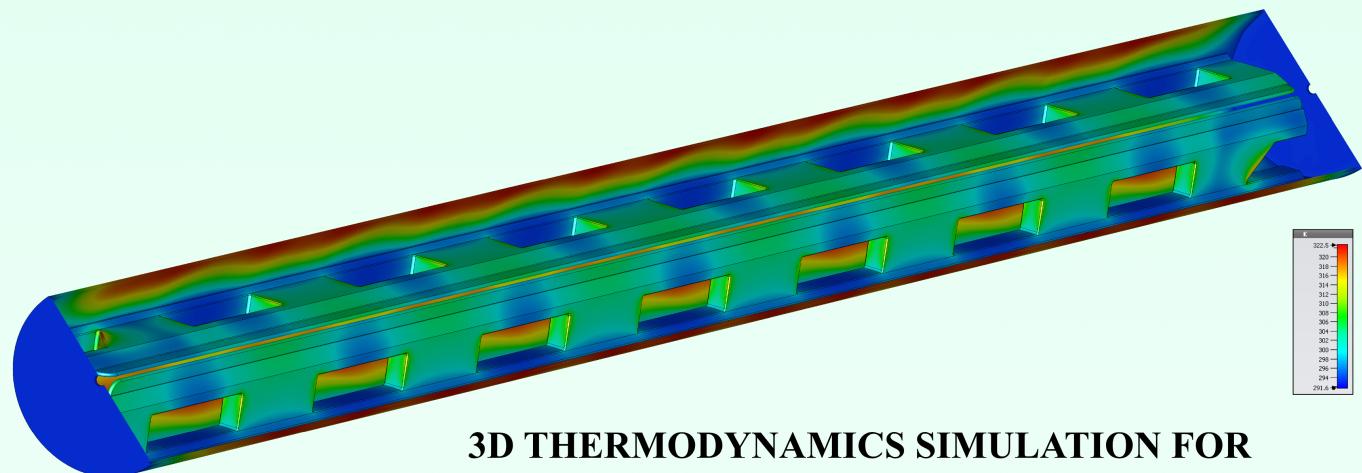
Abstract

Current results of thermodynamics simulations of CW-RFQ cavity are presented in this paper. Accelerating structure is segmented-vane cavity (SV-RFQ) operating at 162 MHz. RFQ linacs are useful for large scale research facilities such as SNS, ADS and FRIB. RFQ are necessary to use for low-energy nuclear and radioactive ion physics (e.g., DERICA - Dubna Electron – Radioactive Ion Collider fAcility project, Dubna, Russia).



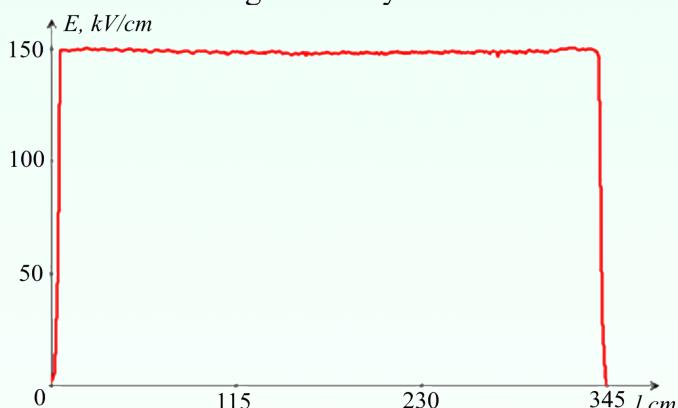
3D SEGMENTED-VANE CAVITY MODEL WITH COOLANT CHANNELS

MAIN GEOMETRICAL CHARACTERISTICS	
Parameter	Value
Length L, cm	345.0
Shell radius R_{shell} , mm	175.0
Cell length L_{cell} , mm	230.0
Transverse window length, % R_{shell}	42
Conjugate window length, % L_{cell}	147.8
1 st end region length, % L_{cell}	110.8
2 nd end region length, % L_{cell}	110.8



3D THERMODYNAMICS SIMULATION FOR THE CW MODE OPERATION

Electrical field amplitude distribution along the cavity axis



MAIN ELECTRODYNAMICS CHARACTERISTICS

Parameter	Value
Frequency, MHz	162.0
Power losses, kW	110
Q-factor	10350
Transverse shunt impedance, $k\Omega$	32
RF field amplitude distribution nonlinearity, %	1.1

MAIN PARAMETERS OF THERMODYNAMICS SIMULATIONS

Parameter	1	2	3
Water flux, l/min	108	163	217
Max. temperature, K	326.1	321.8	319.5
Max. displacement, mm	0.164	0.152	0.144
Frequency shift, MHz	-0.62	-0.55	-0.52