COST Action TU1208
Training School on Electromagnetic Modeling Techniques for Ground Penetrating Radar
Split, Croatia, November 09-12, 2016.

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RESEARCH ACTIVITIES:

Numerical modeling

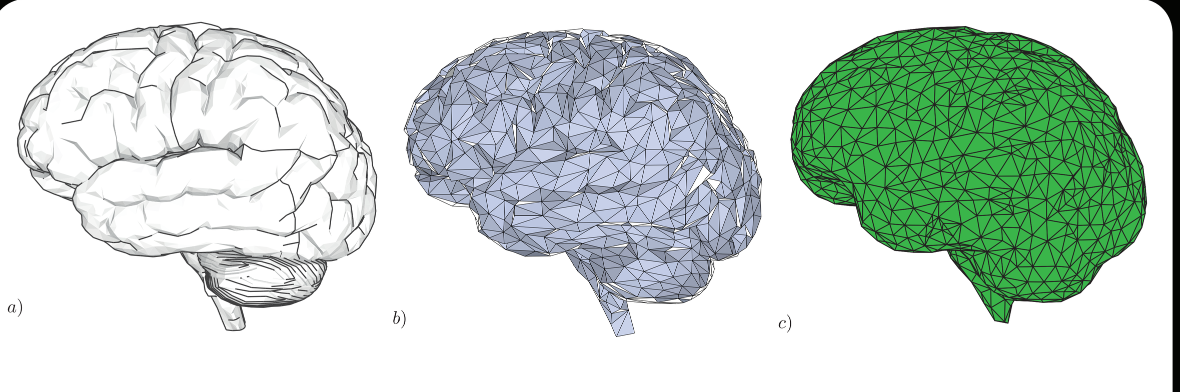
- FEM, BEM, MoM
- integral equation techniques (EFIE/MFIE, SIE, VIE)

Computational bio-electromagnetics

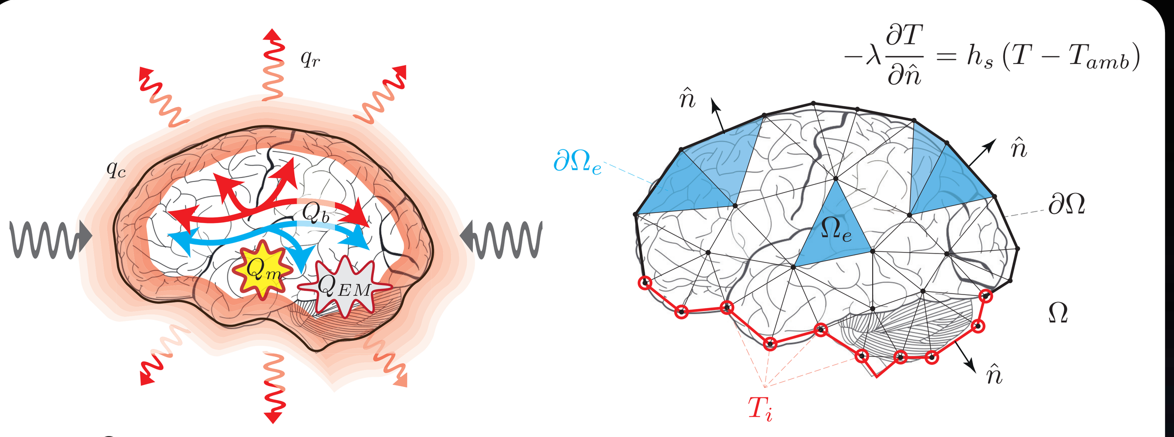
- electromagnetic model (LF, HF)
- thermal model
- electromagnetic-thermal dosimetry
- human exposure to transient EMF (laser-eye interaction)
- human exposure to EMFs
- biomedical application of EMFs (TMS)
- stochastic dosimetry (deterministic+stochastic techniques)

Heat transfer related phenomena

- bioheat transfer
- numerical analysis related to underground power cables



Cvetković, M.; Poljak, D.; An Efficient Integral Equation Based Dosimetry Model of the Human Brain; EMC Europe 2014, 375-380



$$-\lambda\frac{\partial T}{\partial n} = h_s(T - T_{amb})$$

$$\rho C\frac{\partial T}{\partial t} = \nabla(\lambda\nabla T) + W_b c_b (T_a - T) + Q_m + Q_{EM}$$

$$\int_\Omega \lambda\nabla T\cdot\nabla W_j \, d\Omega + \int_\Omega W_b c_b T W_j \, d\Omega + \oint_{\partial\Omega} h_s T W_j \, dS =$$
$$\int_\Omega (W_b c_b T_a + Q_m + Q_{EM}) W_j \, d\Omega + \oint_{\partial\Omega} h_s T_{amb} W_j \, dS$$

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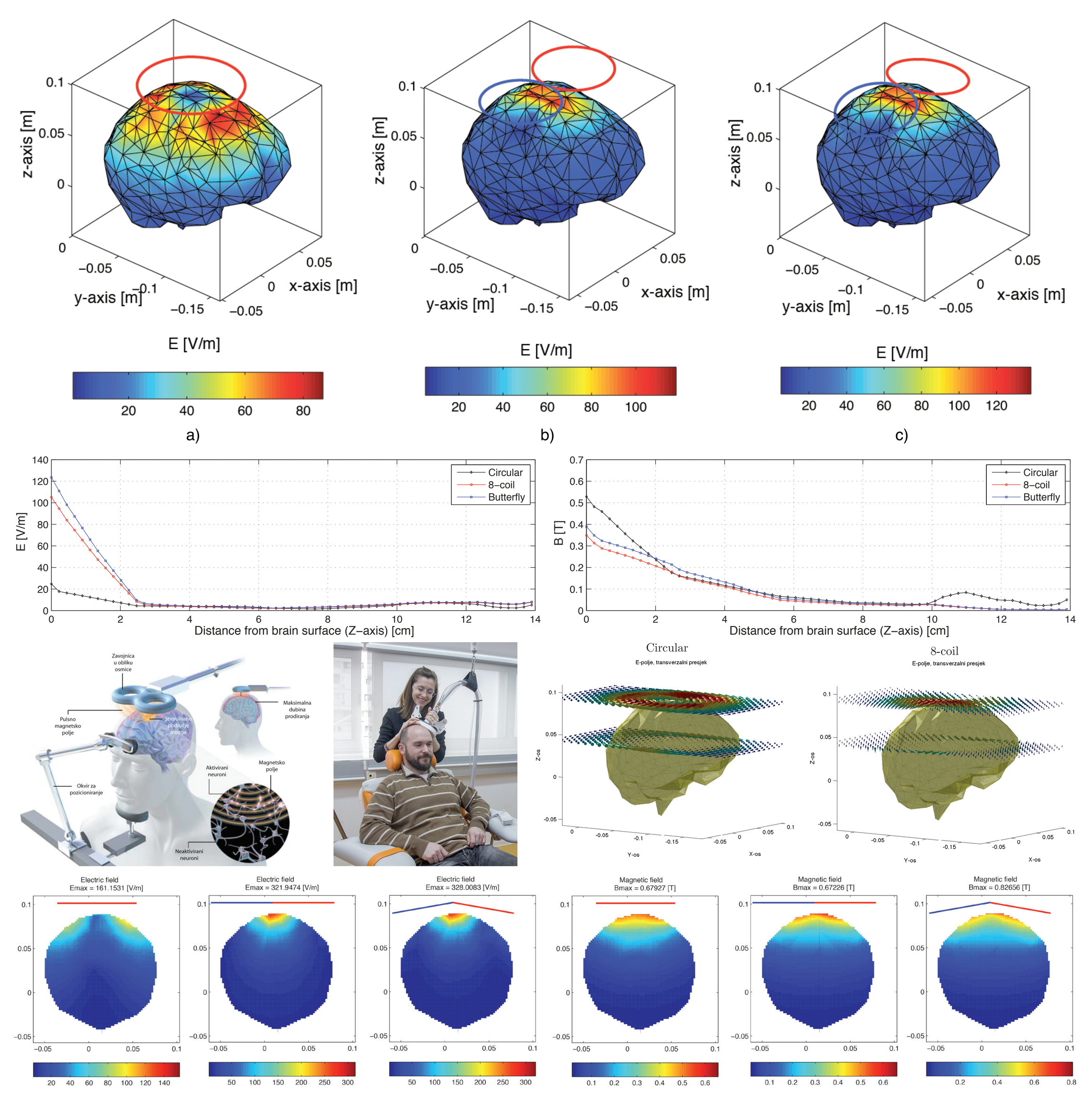
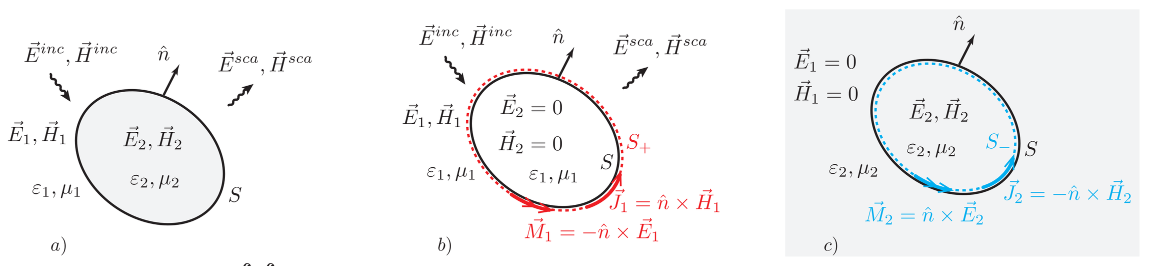


Cvetković, M.; Poljak, D.; Hauesien, J.; Analysis of Transcranial Magnetic Stimulation Based on the Surface Integral Equation Formulation; IEEE transactions on biomedical engineering. 62 (2015), 6; 1535-1545



$$\vec{E}_1^{inc} = j\omega\mu_1 \iint_S \vec{J}(\vec{r}\,')G_1(\vec{r},\vec{r}\,')\,dS' -$$
$$-\frac{j}{\omega\varepsilon_1}\nabla\iint_S \nabla'_S\cdot\vec{J}(\vec{r}\,')G_1(\vec{r},\vec{r}\,')\,dS' + \nabla\times\iint_S \vec{M}(\vec{r}\,')G_1(\vec{r},\vec{r}\,')\,dS'$$
$$0 = j\omega\mu_2 \iint_S \vec{J}(\vec{r}\,')G_2(\vec{r},\vec{r}\,')\,dS' -$$
$$-\frac{j}{\omega\varepsilon_2}\nabla\iint_S \nabla'_S\cdot\vec{J}(\vec{r}\,')G_2(\vec{r},\vec{r}\,')\,dS' + \nabla\times\iint_S \vec{M}(\vec{r}\,')G_2(\vec{r},\vec{r}\,')\,dS'$$

$$j\omega\mu_i \sum_{n=1}^{N} J_n \iint_S \vec{f}_m(\vec{r})\cdot\iint_{S'}\vec{f}_n(\vec{r}\,')G_i(\vec{r},\vec{r}\,')\,dS'\,dS +$$
$$+\frac{j}{\omega\varepsilon_i}\sum_{n=1}^{N} J_n \iint_S \nabla_S\cdot\vec{f}_m(\vec{r})\iint_{S'}\nabla'_S\cdot\vec{f}_n(\vec{r}\,')G_i(\vec{r},\vec{r}\,')\,dS'\,dS +$$
$$\pm\sum_{n=1}^{N} M_n \iint_S \vec{f}_m(\vec{r})\cdot[\hat{n}\times\vec{g}_n(\vec{r}\,')]\,dS +$$
$$+\sum_{n=1}^{N} M_n \iint_S \vec{f}_m(\vec{r})\cdot\iint_{S'}\vec{g}_n(\vec{r}\,')\times\nabla'G_i(\vec{r},\vec{r}\,')\,dS'\,dS =$$
$$= \begin{cases}\iint_S \vec{f}_m(\vec{r})\cdot\vec{E}^{inc}\,dS & ,i=1\\ 0 & ,i=2\end{cases}$$

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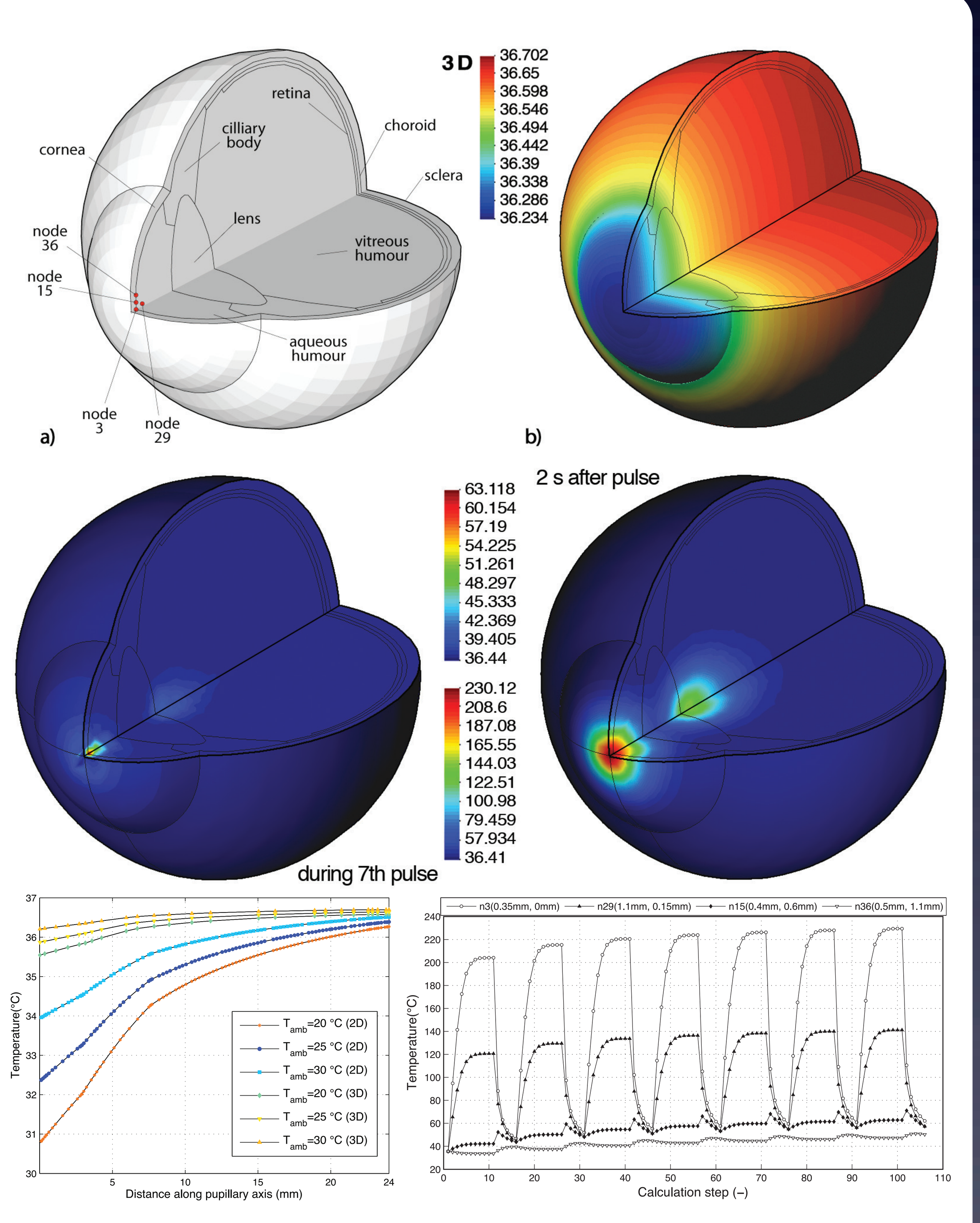
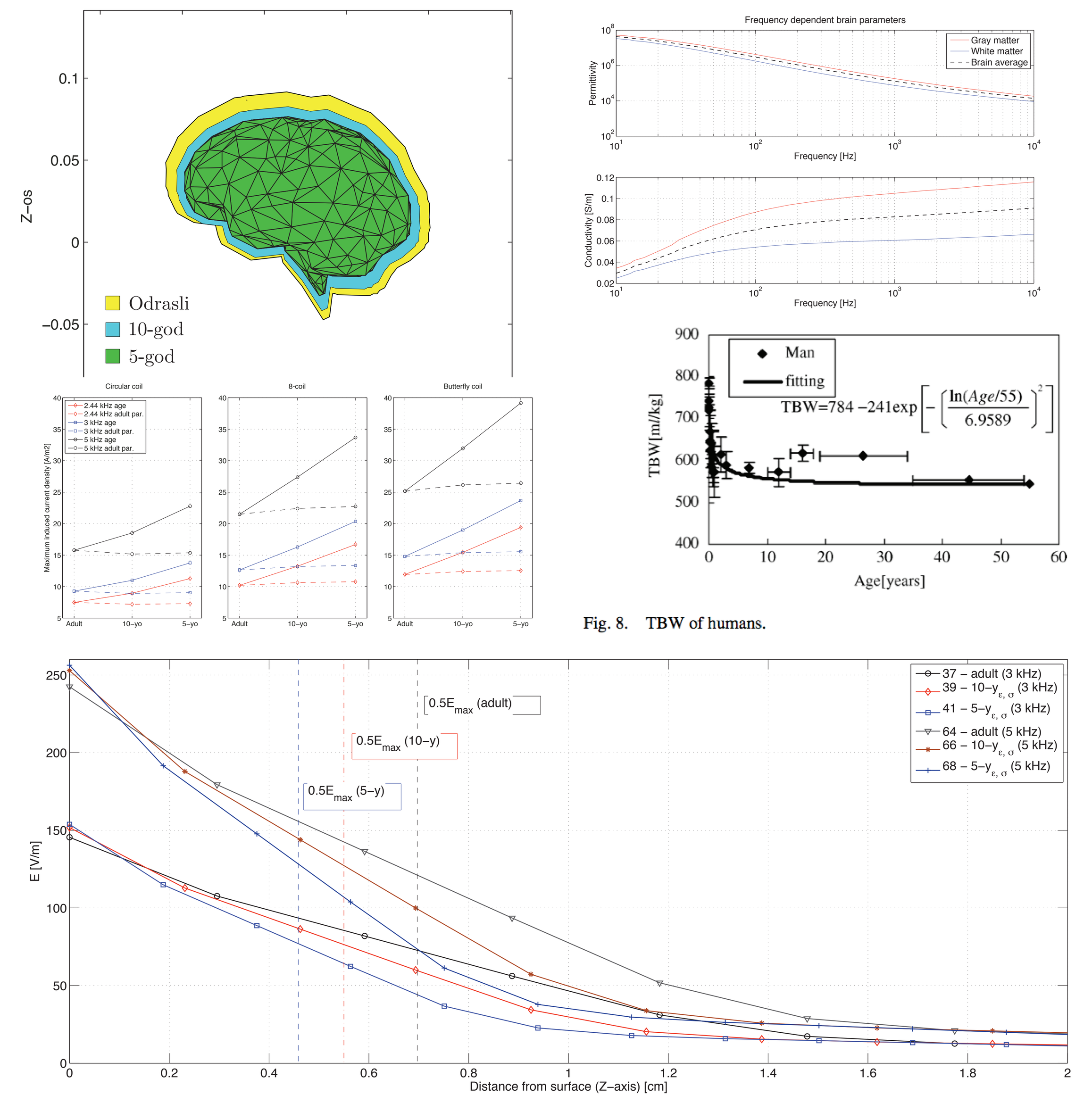
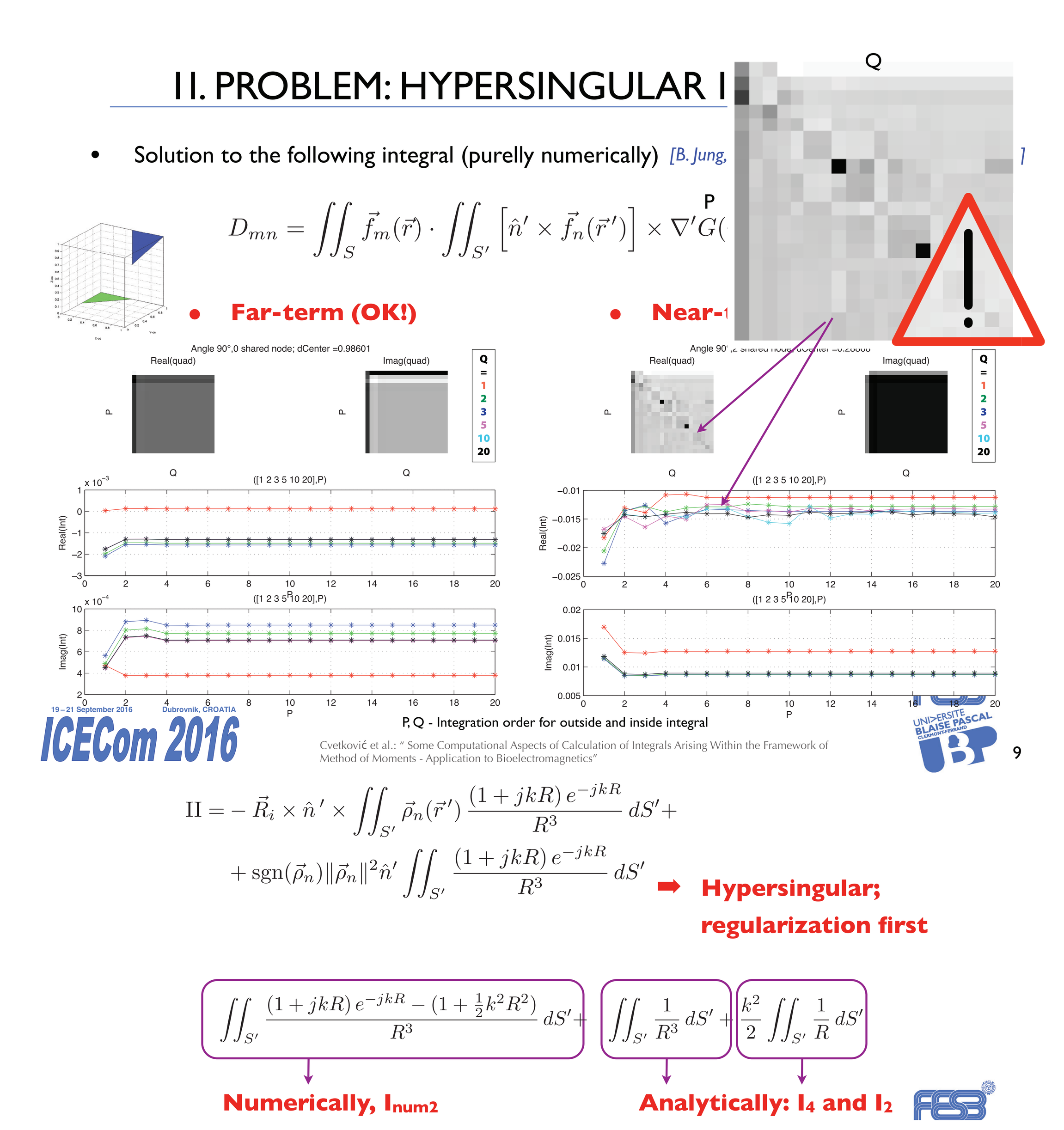


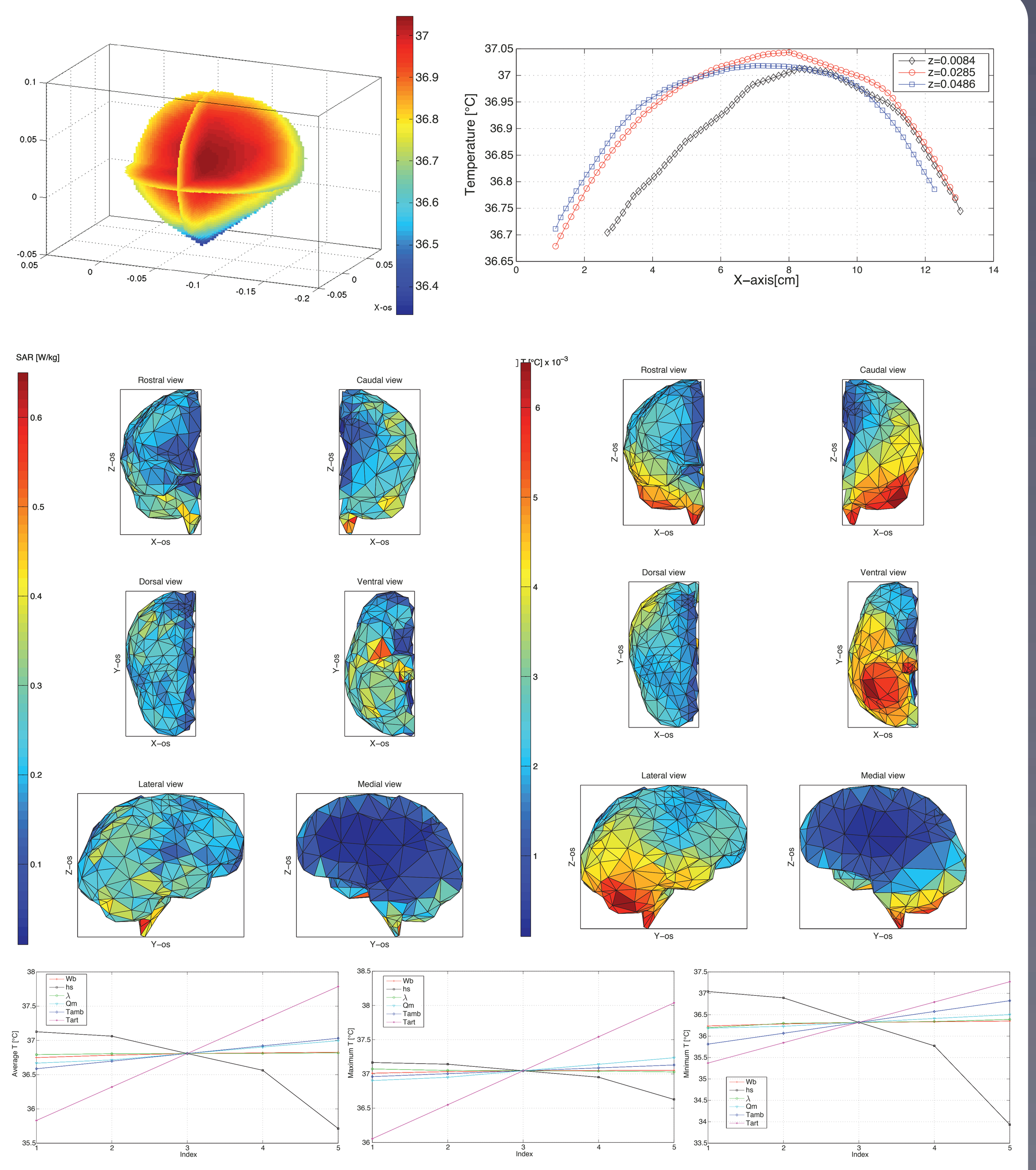
Cvetković, M.; Poljak, D.; Peratta, A.; FETD computation of the temperature distribution induced into a human eye by a pulsed laser; Progress in electromagnetics research-PIER. 120 (2011); 403-421



Cvetković, M.; Poljak, D.; Rogić Vidaković, M.; Đogaš, Z.; Transcranial magnetic stimulation induced fields in different brain models; Journal of electromagnetic waves and applications. 30 (2016), 14; 1820-1835
Cvetković, M.; Poljak, D.; Electromagnetic-thermal dosimetry comparison of the homogeneous adult and child brain models based on the SIE approach; Journal of electromagnetic waves and applications. 29 (2015), 17; 2365-2379



Cvetković, M.; Poljak, D.; Drissi, K. E. K.; Some Computational Aspects of Calculation of Integrals Arising Within the Framework of Method of Moments - Application to Bioelectromagnetics; ICECom 2016, 1-6



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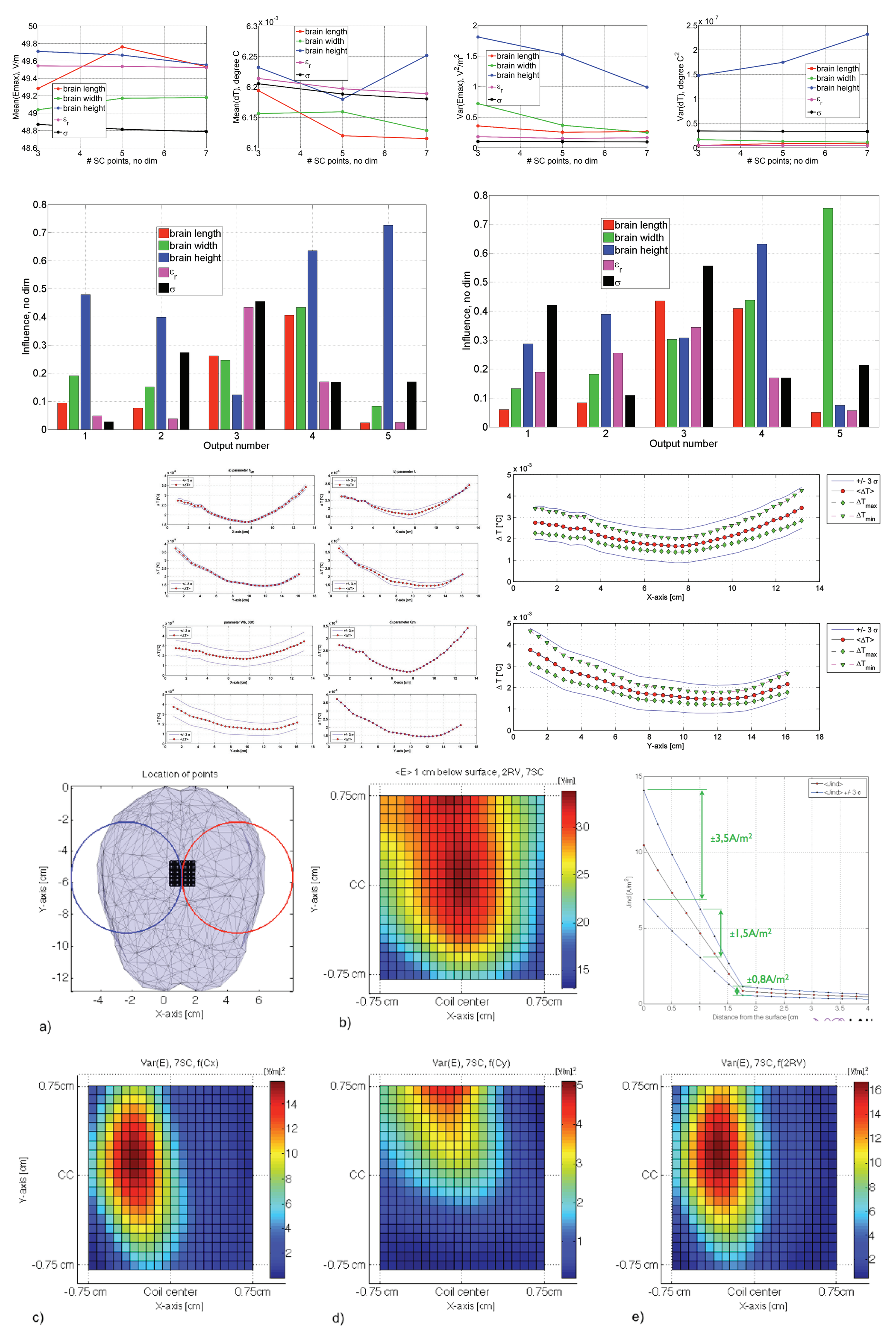

Cvetković, M.; Lallechere, S.; Drissi, K. E. K.; Bonnet, P.; Poljak, D.; Stochastic Sensitivity in Homogeneous Electromagnetic-Thermal Dosimetry Model of Human Brain; Applied Computational Electromagnetics Society journal. 31 (2016), 6; 644-652
Cvetković, M.; Sušnjara, A.; Poljak, D.; Lallechere, S.; Drissi, Khalil K.E.K.; Stochastic Collocation Method Applied to TMS Analysis; BioEM 2016, 151-157
Sušnjara, A.; Cvetković, M.; Poljak, D.; Lallechere, S.; Drissi, K.E.K.; Stochastic sensitivity in thermal dosimetry for the homogeneous human brain model; BioEM 2016, 652-658