

ALTERMAN SUMMER SCHOOL ON GEOMETRIC ALGEBRA AND KÄHLER CALCULUS 2017

Faculty of Transportation Engineering, 20 Hr. Smirnenki Blvd., Sofia (Bulgaria)

Timing	Monday 31 st July	Tuesday 1 st August	Wednesday 2 nd August	Thursday 3 rd August	Friday 4 th August
9:00 – 10:00	Welcome Ceremony / Keynote lecture: <i>Riemann surfaces: Meeting point of Algebra, Analysis, Geometry</i> (Prof. Norbert A'Campo)	Keynote lecture: <i>Riemann surfaces: Meeting point of Algebra, Analysis, Geometry</i> (Prof. Norbert A'Campo)	Excursion	Keynote lecture: <i>Riemann surfaces: Meeting point of Algebra, Analysis, Geometry</i> (Prof. Norbert A'Campo)	Keynote lecture: <i>Riemann surfaces: Meeting point of Algebra, Analysis, Geometry</i> (Prof. Norbert A'Campo)
10:00-11:00	Definition, fundamentals and perspective on Clifford algebra	Definitions of Kähler algebra and perspective on the Kähler calculus		Clifford algebra with the CLIFFORD package for Maple in the computer lab (Prof. Rafał Ablamowicz)	<i>Clifford algebra implementations in Maxima</i> (Dimitar Prodanov)
11:00-11:30	Coffee break	Coffee break		Coffee break	Coffee break
11:30-12:30	The Clifford algebras of the Euclidean and hyperbolic planes	Basic Kähler calculus in orthogonal coordinates		Idempotents, ideals, spinors, primitive idempotents, exterior systems, tensor product of Kähler and tangent Clifford algebras	Keynote lecture: <i>The Unity of Geometry</i> (Prof. José Vargas)
12:30-13:30	The Clifford algebra of the Euclidean space. Reflections, rotations, inversions. Application to geometric problems	Exterior and interior differentiations. Leibniz rules		Laplacians, harmonic strict harmonic and constant differentials	Green's identities and conservation laws. Lie differentiation and angular momentum
13:30-15:00	Lunch	Lunch		Lunch	Lunch
15:00-16:00	The Clifford algebra of Minkowski's spacetime. Lorentz transformations. Closing remarks on Clifford algebra	Hodge dual and relation of interior differentiation to the co-derivative		The Kähler equation and its adjoint	The Kähler-Dirac equation with electromagnetic coupling. Emergence of standard charge
16:00-17:00	Exterior algebra and exterior calculus	The complex variable formalism as a minor extension of the Kähler calculus over the reals. Closing remarks		Particles and antiparticles, chirality, leptons, Cooper pairs, photons	Electrons-positrons and the hydrogen atom

(3rd version, posted July 21st 2017)