Teaching complex potential model to students of environmental engineering faculty using Mathematica

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In this talk we would like to present some our experiences with teaching elements of complex analysis to students of Environmental Engineering Faculty of Warsaw University of Life Science. Complex analysis in this faculty was one of the parts of higher mathematics course. In the framework of this course complex potential fluid flow model in two dimensions was presented. Complex potential is defined as a holomorphic function of a complex variable $f(z) = f(x + iy) = g(x, y) + i h(x, y)$. To understand this model and to be able to solve connected with it tasks, the ability to calculate complex derivatives and integrals along a curve is required. Using CAS programs for teaching the model it seems to be very useful to simplify complex expressions, calculate complex derivatives and integrals and also to present trajectories of the fluid particles graphically and dynamic plot of particle motion. In the framework of our talk we would like to present several examples solving of typical tasks from complex potential for our students using Mathematica. They include determination of complex velocity and circulation of velocity field along a closed curve, determination of the flux of a fluid across the curve and drawing trajectories of the fluid particles. We will also present particles motion animation along the trajectories.

References

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