

**A new graphical method to solving homogenous differential equation systems used in pharmacokinetic analysis**

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**Abstract**

We have proposed an alternative method on the basis of flow graph principles for solving the linear homogenous differential equation systems with constant coefficients used in pharmacokinetic analysis, no matter the number of the unknowns. The classical method for solving these systems using flow graphs entails Laplace transforms before depicting a flow graph and the reverse transformation after using the Mason's rules for calculus. Our method, based also on the flow graph theory, avoids the complicated calculus using Laplace transforms and is more direct than the classical one. Both methods provide the analytical solutions, eliminating the error propagation occurring in the numerical analysis. The numerical analysis and the alternative flow graph method were applied to a well known pharmacokinetic model (parent drug and metabolite kinetics, pre- and systemic metabolism, distribution) and the corresponding pharmacokinetic parameters compared.

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