

Plant Modeling

with

CPFG

Virtual Laboratory

L-studio

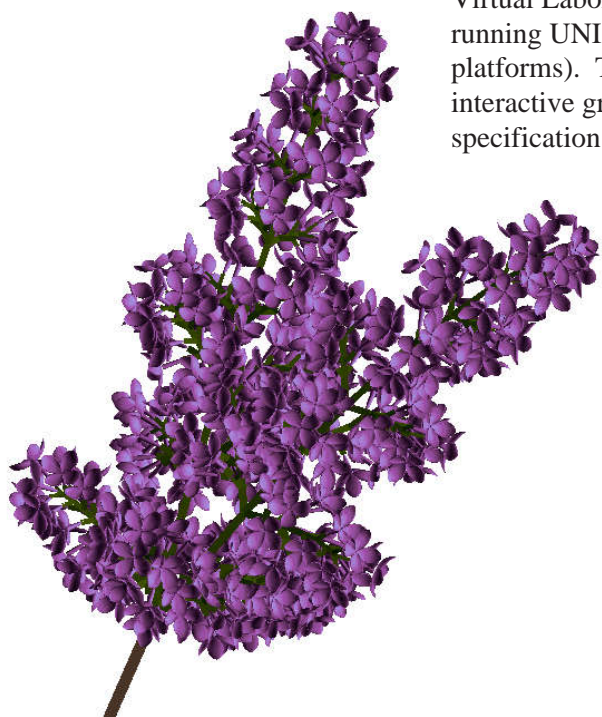


CPFG is a plant simulation program based on the formalism of Lindenmayer systems (L-systems). Its distinctive feature is the flexible modeling language that allows the user to specify the architecture of various modular organisms, from filamentous bacteria and algae to herbaceous plants, trees, and plant ecosystems.

The models can be descriptive or mechanistic (functional-structural) in nature. In the latter case, the user can investigate the impact of physiological (endogenous) and environmental (exogenous) processes on plant development. The results of simulations are visualized as diagrammatic or realistic images of plants. Numerical results are output in user-defined formats as needed for further mathematical analysis.

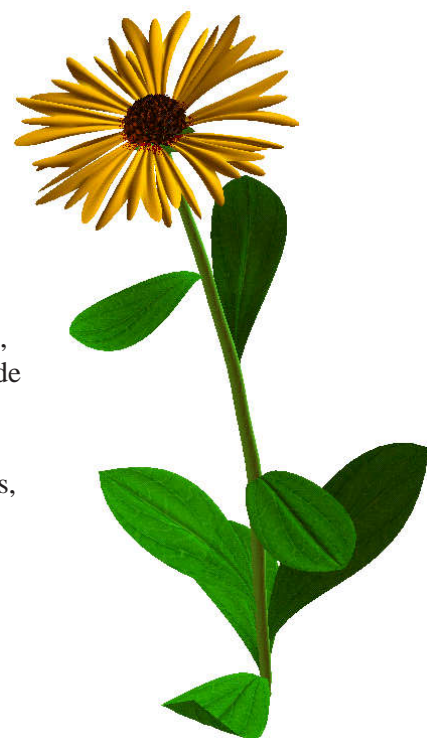


CPFG is integrated into software packages called the Virtual Laboratory (for Silicon Graphics workstations running UNIX) and L-studio (for Windows 95/98/NT platforms). These packages provide additional interactive graphical tools that facilitate model specification and manipulation.



To support functional-structural modeling, the Virtual Laboratory and L-studio include programs that simulate environmental processes, such as:

- collision detection between plant organs,
- light distribution in the canopy,
- transport of substances in the soil.

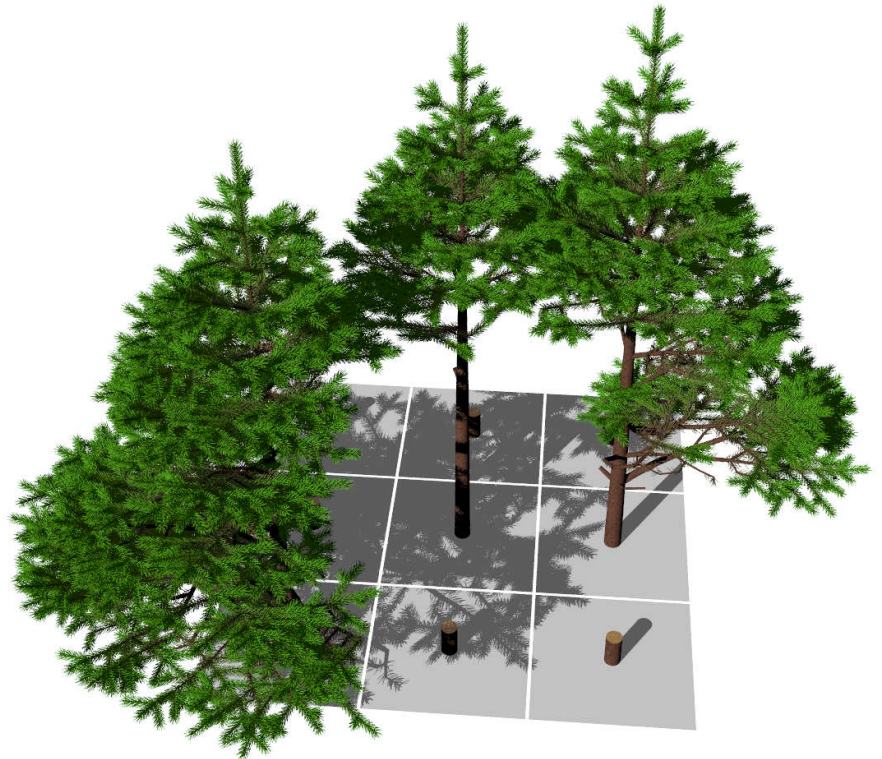


Existing and potential applications of the Virtual Laboratory and L-studio include:

- simulation studies of plant architecture,
- teaching of botany and ecology,
- development of detailed models of specific plants for use in horticulture, agriculture, and forestry,
- computer-assisted landscape design,
- visual reconstruction of extinct plants.



A model of photomorphogenesis in clover



A model of trees competing for light



A model of a tree's response to pruning

The Virtual Laboratory and L-studio are distributed with a set of sample models that illustrate various modeling techniques and features of the software.

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