

Book Contents

This file is a summary of the book contents. The book is divided in 2 parts: one part is about theoretical basis of creating a project with esp-r the second part is about 2 step-by-step projects to illustrate the part 1.

Part 1 : theoretical basis

section 1: installation of esp-r

Quick presentation about installation of esp-r on windows, mac or linux, with binaries or source code.

section 2: creation of a new project

Quick presentation of making a new esp-r model.

section 3: geometric considerations about zones

This section introduce the definition of a zone and explain the main rules that the user may respect : no intersection, one surface per type of boundary condition, vertices ordering consideration. It explain the many methods to define a new zone, with some examples ; how add or modify or delete a surface or vertex. We try to get some technics to quickly modelise a complex zone using the facilities offers by the program.

section 4: thermals considerations about zones

We explain the main principles to attribute some composition to surfaces and boundary conditions.

section 5: optics considerations

This section introduce transparent constructions like windows. It introduce controls for optics constructions, and solar obstructions. The ISH module is introduced for view from sun visualization, shading analysis, internal insolation and DF study.

section 6: about databases

This section presents the management of databases in esp-r, especially climate db, materials and constructions db, optic db.

section 7: HVAC

we have chose to introduce the simplest HVAC systems : basic controller for heating/cooling, free-float controller and fixed injection and extraction for this book. We have also included in this section internal gains definition and infiltration and ventilation. (we don't speak about airflow network for example).

section 8: visualization

This section introduce different visualization that the user can obtain with esp-r : how to modify the Project Manager aspect of the model, hidden line view and Radiance rendering.

section 9: launching a simulation

The last parameters that the user must define before launching a simulation.

section 10: results analysis

Quick description of the RES module and the main features.

Part 2: two step-by-step projects

project 1: thermal simulation of a part of a house

In this project we want modelise a part of a house : only kitchen, stay and living room. In this project we want assist the user to create new zones with different methods introduced in the first part. We also add windows or doors. We define composition with the standard esp-r database, and boundary conditions. We launch a simulation and analyze some results. In a second time, we add infiltration, internal gains and a control loop for heating.

project 2: thermal study of a bioclimatic studio constructed with straw and wood

In this project we want determine the heating consumptions of a studio there is around 10 square meters that we are constructing in Drome (south eastern of France, see photo). Some difficulties were added : walls with high thickness, solar obstructions, user defined databases for materials and constructions, Trombe-Michel walls with high inertia and non symmetrical construction. We launch 2 different simulations: one without Trombe-Michel walls and one with this construction. We don't know if we add DF study to complete the second part, for this time.



Annexs:

annex 1: some definitions about thermal or optic

annex 2: some help about installing Radiance

annex 3: some help about esp-r bug (*like decimal separator
there is most time a comma in France*)