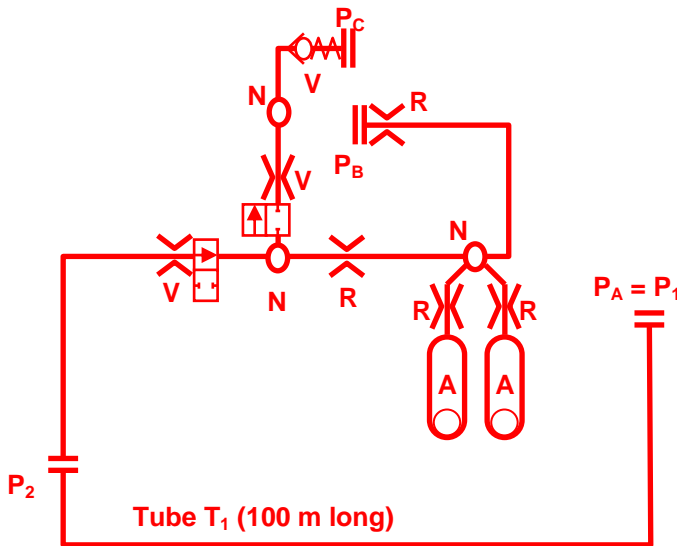


HYDRODYN™

A DYNAMIC SIMULATOR FOR SINGLE-PHASE FLOW IN PIPING & PLANTS



HYDRODYN™ plant scheme : example of oleo-dynamic system

OVERVIEW

Single-phase flow systems are widespread in the industry (e.g. hydraulic or oleo-dynamic systems) and are subjected to a wide range of dynamic phenomena (e.g. transients, water hammers, internal resonances, resonances with the served systems). Very often these phenomena are critical to the main process (if the single-phase system is an auxiliary plant) or to the business (if the single-phase system is itself the main process).

The correct modelling and simulation of the flow system helps the engineers:

- improving the design quality by testing the critical situations prior to the system starting up;
- understanding and correcting anomalous behaviours in the running plant, by comparing the measured values with the expected ones and by trying different remedial actions.

Such “virtual” analysis — by preventing problems or helping solving them — always improves the general plant quality and often avoids expensive contract infringements or remedial actions.

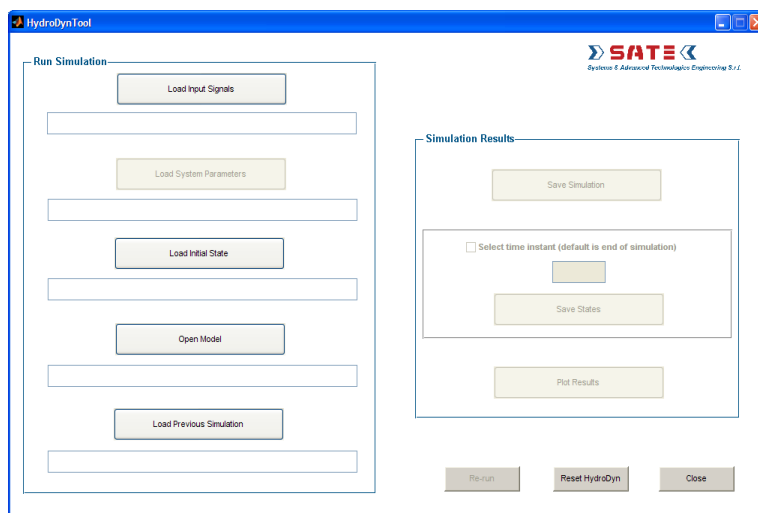
HYDRODYN™ is a Matlab® / Simulink® based simulation software which provides the designer with a complete analysis of the liquid system. It is a cost-effective tool in the plant design and maintenance.

HYDRODYN™ is a complement of S.A.T.E.’s simulation suite for the analysis of centrifugal and axial flow compressors (**COMPSYS™**), in particular for the analysis of seals barrier fluid systems.

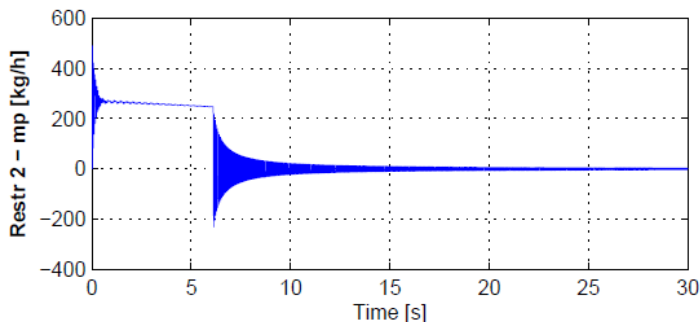
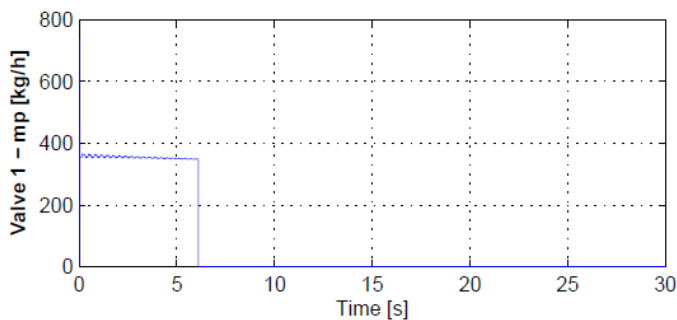
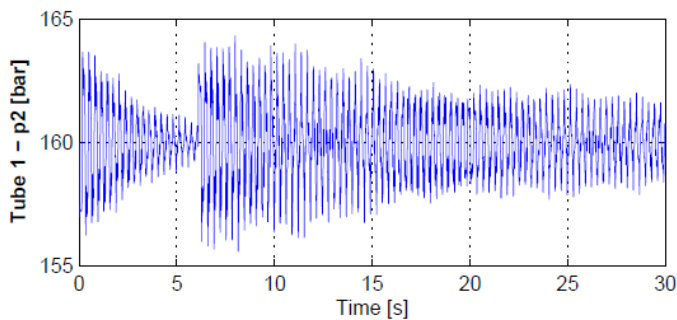
PROGRAM DESCRIPTION

HYDRODYN™ uses a modified non linear formulation of the electro-acoustic analogy to model the dynamic fluid motion in pipes, by means of series of lumped volume and loss elements, which is suitable for turbulent low subsonic flow conditions (Mach \ll 1).

The plant model is built in Simulink® by connecting the easy-to-use blocks of the **HYDRODYN™** library. The Simulink® model represents a set of ordinary differential equations (in the time domain) solved by the powerful and qualified MATLAB® kernel.



HYDRODYN™ main window, clean and simple.



Example of **HYDRODYN™** result plots

The **HYDRODYN™** library includes:

- lumped volumes and lumped losses blocks (0-D blocks);
- non-linear tube blocks with built-in one dimension discretization (1-D blocks);
- non-linear lumped accumulator blocks where the liquid is interfaced with a gas following its own thermodynamic laws (0-D blocks).

HYDRODYN™ provides the pressure, mass flow rate, temperature, volumes, valve opening and other magnitudes of interest for the various plant elements as result of the simulation. The outputs are delivered in easy-to-understand plots versus time.

RELIABILITY

HYDRODYN™ was derived from the fully validated **ACUSYS®** program, another S.A.T.E. application extensively used for pressure pulsation analyses in gas and liquid pipe systems. **HYDRODYN™** has been tested and validated against comparison with existing machines, other commercial CFD codes, and theoretical solutions.

USER INTERFACE

HYDRODYN™ runs into the Matlab® / Simulink® environment, and it is friendly interfaced to the user by graphic buttons and menu commands.

SIMULATION SERVICES

HYDRODYN™ is also used by S.A.T.E. as a tool for engineering services provided to customers who wish not to enter the functions and details of the program. In this case the results of the simulations are produced in form of reports, together with comments and specifications for plant modifications.

S.A.T.E. - Systems and Advanced Technologies Engineering S.r.l.

Santa Croce 664/a
30135 VENEZIA (ITALIA)
C.F. e P.IVA : 03040950275
Cap. Soc. : € 39 000 (interamente versato) – Iscr. CCIAA di Venezia, REA 25294/1998

tel.: + 39 - 0 4 1 2 7 5 7 6 3 4
fax: + 39 - 0 4 1 2 7 5 7 6 3 3
E-mail: info@sate-italy.com

HYDRODYN™ 1.0 E' STATO REALIZZATO AVVALENDOSI DEL FINANZIAMENTO POR OBIETTIVO COMPETITIVITÀ REGIONALE E OCCUPAZIONE PARTE FESR, 2007-2013

Asse 1 Azione 1.1.3: Contributi per l'utilizzo da parte delle imprese di strutture qualificate per l'attività di ricerca



UNIONE EUROPEA



REGIONE DEL VENETO

IL VENETO UNA REGIONE D'EUROPA