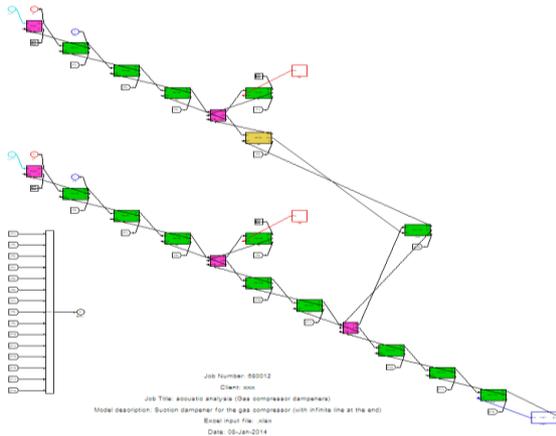
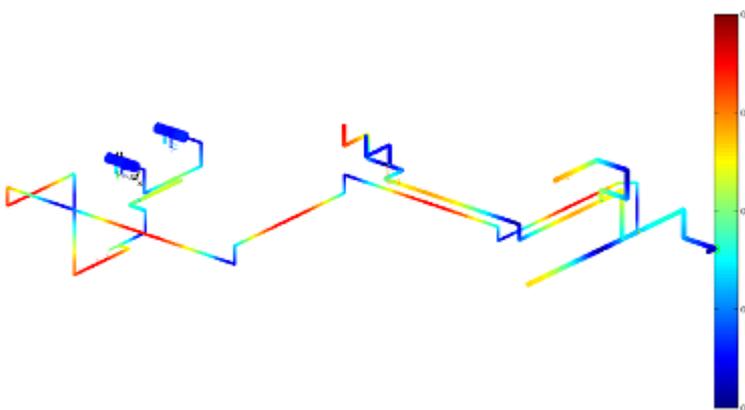


ACUSYS®

A SIMULATOR OF PRESSURE PULSATIONS IN PIPING & PLANTS



Simulink® plant model



ACUSYS® pressure response



Design of pulsation suppression devices (prior and after modification)

OVERVIEW

Pressure pulsations occur in fluid systems subjected either to periodical excitation, e.g. due to reciprocating compressors, or by transient flow conditions, e.g. due to valves operations, control systems intervention, pumps or compressors speed changes, start-up or stop, or by vortexes excited at junctions and obstructions in the piping.

These actions may lead to resonance and excessive pressure variation amplitudes even at locations far from the flow sources, depending on the dynamic characteristics of the whole pipe-work system. Such unwanted plant/machinery operation may often result in costly infringement of contract clauses and remedial actions.

ACUSYS® is a PC-based simulation software which helps preventing these situations, providing the designer quantitative and qualitative information to complete the plant's analysis¹ and define suitable acoustic filters or piping modifications and stiffeners. It is a cost-effective alternative to the trial and error approach used in the definition of size and position of pressure pulsation dampers.

PROGRAM DESCRIPTION

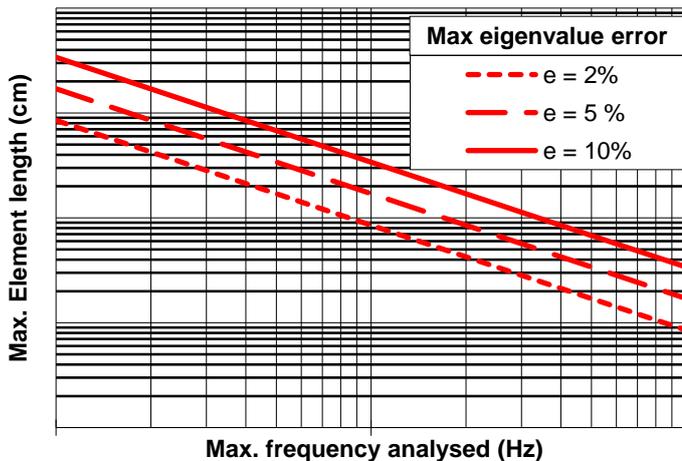
ACUSYS® simulates, in the frequency and time domains, the dynamic response of the fluid medium in a plant, either liquid, gas or dispersed biphasic.

The plant is described by discrete elements, following the linear electro-acoustic equivalence: the resulting model can however be modified to incorporate non linear components or propagation equations. The new **ACUSYS® 6** automatically generates the plant model starting from the input data file, which turns into high time savings.

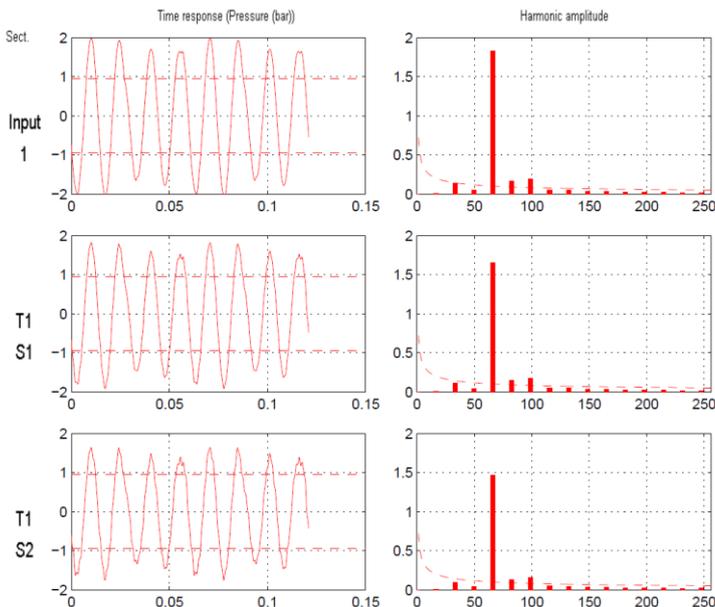
A very high degree of pipes discretization allows a very high approximation of the propagation phenomena, by short computation times.

¹ E.g.: API St.618 for reciprocating compressors and API St.674 for reciprocating pumps.

PIPE DISCRETISATION



ACUSYS® pipe discretization criteria



ACUSYS® response signals and harmonic analysis

Different flow conditions and phases can be considered at various plant and pipes sections, thus allowing the analysis of complex and diverse plant configurations.

ACUSYS® provides the acoustic pressure, flow rate and shaking forces at piping joints and bends as response to multiple stationary inputs. It also performs the time domain analysis of transients and allows simulating and verifying the "water hammer effect" during transients in hydraulic systems.

The new **ACUSYS® 6** also has an independent module, called **MechDyn™**, which carries out the mechanical analysis of the piping, providing its natural frequencies and vibrating modes (in order to verify their separation from acoustic resonant pulsations).

RELIABILITY

ACUSYS® has been deeply tested and validated against comparison with existing machines, other commercial CFD codes and theoretical solutions: some of these latter are delivered as free demos to allow both qualification of the procedure and user practising.

USER INTERFACE

ACUSYS® runs under The Mathworks' MATLAB / SIMULINK® environment, and it is friendly interfaced to the user by graphic buttons and menu commands.

SIMULATION SERVICES

ACUSYS® 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. can also provide the design of pulsation suppressor devices.

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

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ACUSYS® 6 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



REGIONE DEL VENETO

IL VENETO UNA REGIONE D'EUROPA