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An Active Network Representation to Predict the Flow Noise
Characteristics of Corrugated Ducts

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In this paper, an active network representation is used to numerically predict and gain more insight in the internally generated flow noise sources in corrugated ducts (the active bi-port component) as well as to describe the acoustic transmission characteristics of this type of application (the passive bi-port components) in the presence of a non-uniform mean flow. For this purpose a numerical approach is chosen, using compressible Large Eddy Simulations (LES) to predict the noise generation mechanisms and Linearized Euler Equations (LEE) with a plane pulse excitation to obtain the transmission characteristics for these components. The accuracy of the active network component determination is increased by separating the aerodynamic and the acoustic fluctuating field of the LES using both an aerodynamic/acoustic splitting technique and multiple plane mode-matching strategies. In this way, a numerical method is proposed to analyze the flow-acoustic behavior of corrugated tubes, which can be generally used for all types of duct system applications.