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A parameter map of synthetic jet regimes based on the Reynolds and Stokes numbers: Commentary on the article by Rimasauskiene et al.

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ABSTRACT

Recently, Rimasauskiene et al. ([1] Mech. Syst. Signal Process. (2015) 50–51) presented an experimental study focusing on synthetic jets. Their paper presented a parameter map based on the Reynolds number. However, the map was shown without an adequate explanation, without definition of the horizontal axis, and without cross-connections with previous literature. This commentary attempts (A) to elucidate the unnecessary misunderstanding for readers and (B) to reveal that the parameter map, based on the Reynolds and Stokes numbers, can be a useful tool in the study of synthetic jets.

1. Introduction

The recent study by Rimasauskiene et al. [1] was focused on actuators generating synthetic jets (SJs) (the SJ is a fluid flow that is created from periodic fluid pulsation – see, e.g. [2,3]). The paper [1] presented a parameter map based on the Reynolds and Stokes numbers. Unfortunately, this map was incomplete and lacked adequate explanations and citations. Moreover, a definition of the horizontal axis of the map (Stokes number, as is reconstructed in this commentary) was completely missing [1]. The reason for this short communication is (A) to clarify the matter, including the cross-connections with previous literature and data, which were used in the mentioned parameter map and were missing in [1]. Moreover, (B) the reasonability of the parameter map, based on the Reynolds and Stokes numbers, for SJ studies is suggested.

2. Parameters of synthetic jets

Fig. 1 shows the Re_H–S_H parameter map presented by Rimasauskiene et al. [1] with a caption of "Synthetic jet criteria of existence" and with reference to a conference paper by Matějka et al. [4] – where the graph was presented in the same form as in Fig. 1. Unfortunately, a definition of the S_H (horizontal axis of the graph) is missing in both studies [1,4]. Moreover, neither [1] nor [4] presented an adequate explanation of the large number of points plotted in Fig. 1. To reconstruct the missing information, we used the original publication, which is the student conference paper by Broučková et al. [5]. It is worth mentioning here that both papers [1,4] show only a partial cut (modified from Czech to English) of a more complete graph from [5]. Fig. 2 shows the original graph [5] (modified from Czech to English). An explanation of the meaning of this

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0888-3270/

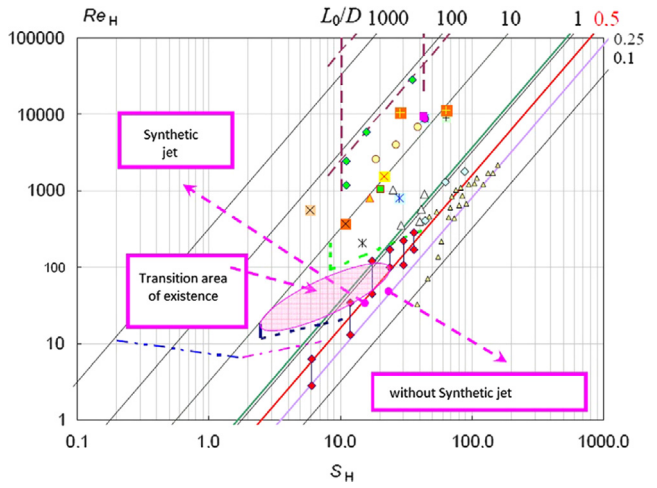

Fig. 1. Parameter map presented by Rimasauskiene et al. [1] with the Synthetic jet criteria of existence with reference to a conference paper by Matějka et al. [4].

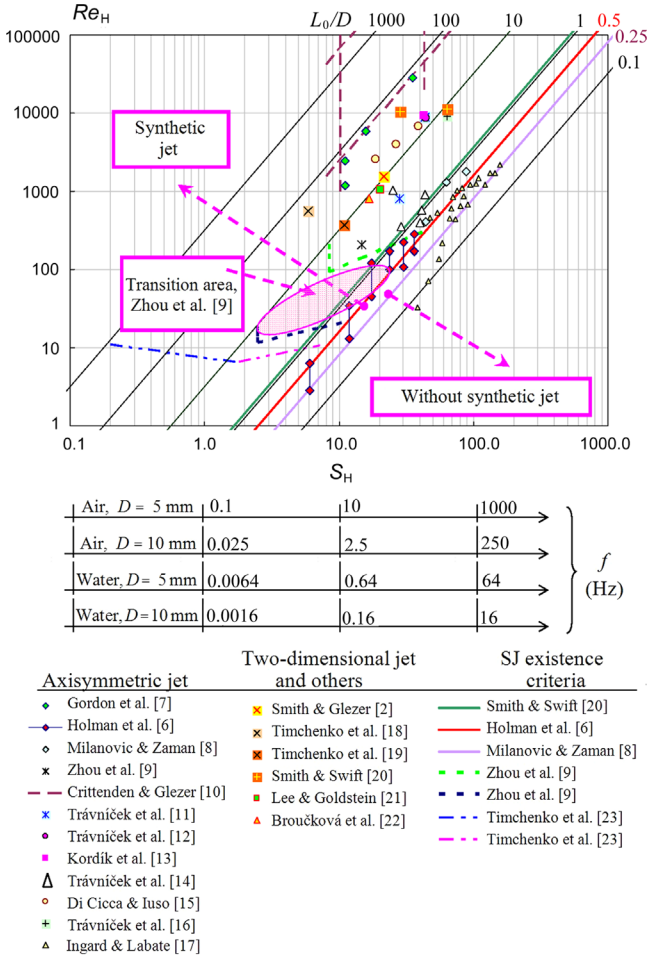

Fig. 2. Re_H–S_H parameter map originated from Broučková et al. [5] (translated from Czech [5] to English).