

Embeddings into products of trees

G graph of bounded degree.

Embeddings into products of trees

G graph of bounded degree.

Theorem (Dranishnikov 2002)

If $\text{asdim } G < \infty$, then $G \xrightarrow{\text{coarse}} T_0 \times T_1 \times \cdots \times T_m$.

Embeddings into products of trees

G graph of bounded degree.

Theorem (Dranishnikov 2002)

If $\text{asdim } G < \infty$, then $G \xrightarrow{\text{coarse}} T_0 \times T_1 \times \cdots \times T_m$.

Question: can we take the T_i 's of **bounded degree**?

Embeddings into products of trees

G graph of bounded degree.

Theorem (Dranishnikov 2002)

If $\text{asdim } G < \infty$, then $G \xrightarrow{\text{coarse}} T_0 \times T_1 \times \cdots \times T_m$.

Question: can we take the T_i 's of **bounded degree**?

What tool?

Embeddings into products of trees

G graph of bounded degree.

Theorem (Dranishnikov 2002)

If $\text{asdim } G < \infty$, then $G \xrightarrow{\text{coarse}} T_0 \times T_1 \times \cdots \times T_m$.

Question: can we take the T_i 's of **bounded degree**?

What tool? **Separation profile** [Benjamini, Schramm, Timár].

Embeddings into products of trees

G graph of bounded degree.

Theorem (Dranishnikov 2002)

If $\text{asdim } G < \infty$, then $G \xrightarrow{\text{coarse}} T_0 \times T_1 \times \cdots \times T_m$.

Question: can we take the T_i 's of **bounded degree**?

What tool? **Separation profile** [Benjamini, Schramm, Timár].

Proposition (Benjamini, Schramm, Timár, 2011)

If $G \xrightarrow{\text{coarse}} H$, then $\text{sep}_G \preceq \text{sep}_H$.

Embeddings into products of trees

G graph of bounded degree.

Theorem (Dranishnikov 2002)

If $\text{asdim } G < \infty$, then $G \xrightarrow{\text{coarse}} T_0 \times T_1 \times \cdots \times T_m$.

Question: can we take the T_i 's of **bounded degree**?

What tool? **Separation profile** [Benjamini, Schramm, Timár].

Proposition (Benjamini, Schramm, Timár, 2011)

If $G \xrightarrow{\text{coarse}} H$, then $\text{sep}_G \preceq \text{sep}_H$.

$\text{sep}_{\tilde{T}_0 \times \tilde{T}_1 \times \cdots \times \tilde{T}_m} \preceq \frac{n}{\log n}$ (trees of bounded degree)

Embeddings into products of trees

G graph of bounded degree.

Theorem (Dranishnikov 2002)

If $\text{asdim } G < \infty$, then $G \xrightarrow{\text{coarse}} T_0 \times T_1 \times \cdots \times T_m$.

Question: can we take the T_i 's of **bounded degree**?

What tool? **Separation profile** [Benjamini, Schramm, Timár].

Proposition (Benjamini, Schramm, Timár, 2011)

If $G \xrightarrow{\text{coarse}} H$, then $\text{sep}_G \preceq \text{sep}_H$.

$\text{sep}_{\tilde{T}_0 \times \tilde{T}_1 \times \cdots \times \tilde{T}_m} \preceq \frac{n}{\log n}$ (trees of bounded degree)

Proposition (Hume 2017)

$\text{sep}_G(n)/n \not\rightarrow 0$ iff G contains a family of expanders E_n as subgraphs.

Summary of the construction:

- Two finite groups A and B ,

Summary of the construction:

- Two finite groups A and B ,
- A sequence of finite groups $(\Gamma_s)_{s \geq 0}$, such that $\Gamma_s = \langle A_s \cup B_s \rangle$,

Summary of the construction:

- Two finite groups A and B ,
- A sequence of finite groups $(\Gamma_s)_{s \geq 0}$, such that $\Gamma_s = \langle A_s \cup B_s \rangle$, and $(\text{Cay}(\Gamma_s, A_s \cup B_s))_{s \geq 0}$ is an expander.

Summary of the construction:

- Two finite groups A and B ,
- A sequence of finite groups $(\Gamma_s)_{s \geq 0}$, such that $\Gamma_s = \langle A_s \cup B_s \rangle$, and $(\text{Cay}(\Gamma_s, A_s \cup B_s))_{s \geq 0}$ is an expander.
- A sequence of homomorphisms $\pi_s: A * B * \mathbb{Z} \rightarrow \bigoplus_{\mathbb{Z}} \Gamma_s \rtimes \mathbb{Z}$.

Summary of the construction:

- Two finite groups A and B ,
- A sequence of finite groups $(\Gamma_s)_{s \geq 0}$, such that $\Gamma_s = \langle A_s \cup B_s \rangle$, and $(\text{Cay}(\Gamma_s, A_s \cup B_s))_{s \geq 0}$ is an expander.
- A sequence of homomorphisms $\pi_s: A * B * \mathbb{Z} \rightarrow \bigoplus_{\mathbb{Z}} \Gamma_s \rtimes \mathbb{Z}$.

- Finally we set

$$\Delta = A * B * \mathbb{Z} / \bigcap_{s \geq 0} \ker \pi_s.$$

Summary of the construction:

- Two finite groups A and B ,
- A sequence of finite groups $(\Gamma_s)_{s \geq 0}$, such that $\Gamma_s = \langle A_s \cup B_s \rangle$, and $(\text{Cay}(\Gamma_s, A_s \cup B_s))_{s \geq 0}$ is an expander.
- A sequence of homomorphisms $\pi_s: A * B * \mathbb{Z} \rightarrow \bigoplus_{\mathbb{Z}} \Gamma_s \rtimes \mathbb{Z}$.

- Finally we set

$$\Delta = A * B * \mathbb{Z} / \bigcap_{s \geq 0} \ker \pi_s.$$

For a suitable choice of $(\Gamma_s)_{s \geq 0}$ and $(k_s)_{s \geq 0}$, we get

Summary of the construction:

- Two finite groups A and B ,
- A sequence of finite groups $(\Gamma_s)_{s \geq 0}$, such that $\Gamma_s = \langle A_s \cup B_s \rangle$, and $(\text{Cay}(\Gamma_s, A_s \cup B_s))_{s \geq 0}$ is an expander.
- A sequence of homomorphisms $\pi_s: A * B * \mathbb{Z} \rightarrow \bigoplus_{\mathbb{Z}} \Gamma_s \rtimes \mathbb{Z}$.

- Finally we set

$$\Delta = A * B * \mathbb{Z} / \bigcap_{s \geq 0} \ker \pi_s.$$

For a suitable choice of $(\Gamma_s)_{s \geq 0}$ and $(k_s)_{s \geq 0}$, we get

$$\text{sep}_{\Delta} \gg \frac{n}{\log n}$$

(along a subsequence).

Thank you !